SOUTH-SOUTH COOPERATION IN A DIGITAL WORLD

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Foreword I

The world today is experiencing changes driven by digital technology, and digital technology has become an important force for global economic growth. Despite the rise of global trade protectionism, the platform economy, cross-border e-commerce, intelligent contracts, digital finance and other new industrial-organization, trade, contract and financing methods are bringing new opportunities for global economic change. Education and health services driven by digital technology also provide new ways to promote more equitable access to universal social services. *South-South Cooperation in a Digital World* presents new areas and modes of cooperation and invigorate efforts to achieve the goal of sustainable development by 2030.

In September 1978, the United Nations Conference on Technical Cooperation among Developing Countries adopted the Buenos Aires Plan of Action for Promoting and Implementing Technical Cooperation among Developing Countries (BAPA), which became an important milestone in South-South cooperation. For 40 years, technical cooperation has been the focus of development cooperation. The basic goals of technical cooperation among developing countries are their shared support and mutual benefit, which contribute to achieving the broader development goals of Southern countries. Technical cooperation can help to improve the innovative capacity of developing countries, stimulate their development potential and promote their collective self-reliance. Today the Buenos Aires Plan of Action, with its emphasis on sharing experience and mutual benefit, remains relevant to the promotion of South-South cooperation in the field of digital technology. It is important to seize opportunities for new technological changes, benefit the people of developing countries, and share the fruits of human economic and social progress.

In March 2019 during the United Nations activities to commemorate the fortieth anniversary of the adoption of the Buenos Aires Plan of Action, the United Nations Office for the South-South Cooperation and the Finance Center for South-South Cooperation will jointly launch *South-South Cooperation in a Digital Wo*rld Report, promoting South-South cooperation in a field of digital technology aimed at promoting new technological changes, a new digital economy and sharing digital economic growth in the Global South. It is very important to build a digital society, promote more equitable and universal access to basic public services such as education and health, and promote the achievement of the goal of sustainable development.

South-South Cooperation in a Digital World presents the forward-looking views of many experts in the field of international development. It points out that the total amount of data in the world is growing exponentially. Digital knowledge and information become new production factors, important strategic resources for promoting development; the platform economy becomes a new industrial organization model; and virtual reality and online communities become new communities of cyberspace. The report further points out that cooperation in cross-border e-commerce cooperation is ongoing in Southern countries, especially in emerging economies, where indigenous platform companies have emerged as engines of trade facilitation. Intelligent contracts based on blockchains can not only improve the speed and efficiency of transactions but also have a positive impact on preventing the risk of fraud and promoting business integrity. They also stimulate tripartite cooperation and opportunities to achieve charitable and commercial goals. Digital finance helps to achieve more inclusive and universal financial services. Cashless payments and settlements are bringing new financial instruments and opportunities to least developed countries and regions lacking traditional business networks. Digital technology also drives social governance, social services and social interaction to become more intelligent and makes connections between people, between things, and between people and things ubiquitous.

The present report further points out that digital technology is fundamentally changing the overall economic and social patterns and contributing to the sustainable economic and social development of Southern countries. Nevertheless, the penetration rate of digital infrastructure in Southern countries varies considerably, the utilization capacity and application of digital technology also vary greatly, and the accumulation of human capital brought by digital technology is far from adequate. Therefore, it is the intention of this report to encourage the development of new cooperation mechanisms and the building of a better cooperative ecosystem so that all countries can use digital technology to promote their own economic and social sustainable development.

I believe that the opinions in this report will lead to wider discussion and criticism, which will undoubtedly help the international community and other relevant parties to raise their awareness of South-South Cooperation in a Digital World and contribute to the achievement of the goal of sustainable development by 2030.

Mr. E'sheng Cai
Chairman of the Finance Centre for South-South Cooperation

Foreword II

The digital economy is a fascinating conundrum. It encompasses the very best of human innovation. We have merged technology and thinking to create artificial intelligence and machine learning. We have created vast global networks of information-sharing through the Internet and digital communications, which in and of themselves have spurred the disruption of old economies and the creation of new ones. The digital economy is fundamentally challenging the principles on which we have imagined the future of work. It has created new currencies, new personas, new communities, new cultures and new societies. The digital economy has provided the ingredients for an integrated planet once thought of only in the pages of science fiction a mere 50 years ago.

Yet we do not quite know exactly what the digital economy is or, perhaps more important, how it is fundamentally impacting humanity and the way in which it sees, defines and engages with itself. The number of definitions may even match the breadth of participants in the global start-up ecosystem. However, our understanding of the digital economy may be academic when we consider how concentrated its progress has been in the Global North, exacerbating the digital skills, access and economic-growth divides in the developing world. The positive impacts of the digital economy have been far less than equitable and uniform across all countries and peoples. Consider, for example, the differential in venture capital and seed funding from an angel investment. In 2017, African start-ups received approximately $550 million; in North America, in contrast, technology entrepreneurs had access to a funding ecosystem providing over $1 billion per fiscal quarter, with $100 million deals occurring nearly every day. This is despite the African continent's being one of the fastest-growing markets for consumer adoption and use of information and communications technology (ICT).

Of course, this story is, like the digital economy itself, not uniform across all countries and regions outside Northern countries. China, for example, has seen dramatic and robust integration with the digital economy, as have many countries in Southeast Asia and South America. Is there an opportunity to break through the digital

divide to ensure that all countries in the Global South can take full advantage of the opportunities and possibilities offered by the digital economy? This is the question being broached in the present joint report by the Finance Centre for South-South Cooperation and the United Nations Office for South-South Cooperation through its consideration of the potential opportunities and potential risks of digitalization for development progress in the Global South, particularly in term of advancing towards the achievement of the Sustainable Development Goals (SDGs).

In addition to the above, this landmark report explores how the countries of the Global South can cooperate and collaborate among themselves and with other partners to facilitate a rapid and sustainable bridging of this gap in access to the digital economy. In all likelihood, such cooperation will not be a silver bullet. Instead, South-South and triangular cooperation will be an integral component of a larger ecosystem of activity to drive equality and inclusion in the digital economy. This report provides a first step in defining a global strategy for doing so.

Mr. Jorge Chediek
Director of the United Nations Office for South-South Cooperation and Envoy of the Secretary General on South-South Cooperation

Executive Summary

As the global economy moves steadily towards digitalization, developing countries should not be left behind. Sustainable and inclusive economic development, a cornerstone of the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs), may well be greatly facilitated by the developing world's burgeoning technology sector, particularly small and medium-sized enterprises engaging in the platform economy and digital trade. Indeed, the digitization of services, including via smart contracts, information and communications technology (ICT) and the blockchain, offers opportunities for improved access to and participation in the global (digital) economy by populations of the Global South.

In this context, the present joint report by the Finance Centre for South-South Cooperation (FCSSC) and the United Nations Office for South-South Cooperation (UNOSSC) provides an in-depth analysis of the potential opportunities and potential risks of digitalization for development progress in the Global South, particularly in terms of progress towards SDGs. However, harnessing the opportunity for dynamic change in sustainable development created by the digital economy, particularly for the Global South, can happen only if the associated risks are addressed effectively by governments, private-sector partners and international organizations as well as leaders and the general public. South-South Cooperation (SSC) has been identified as a means, a method and a series of tools by which developing countries can collaborate to enhance their opportunities and collectively face their challenges in the digital era.

In light of the above, the present report first explores and analyses development prospects as well as trends affecting digital industries in the Global South and puts forward proposals for digital industrial cooperation among Southern countries. Second, this report focuses on the impact of digital technology on promoting cross-border trade and trade facilitation, the application of smart contracts in cross-border trade and smart supervision issues. It further provides analysis on the potential of digital finance to promote the development of inclusive finance and proposes developing digital financial infrastructure, human capital investment and capacity-building in developing countries.

Doing so may facilitate the development by the Global South of a smart society nested society nested in the digital world, which could include digital education, Internet health care and social networking, and promote the inclusive development of countries of the South. Finally, the report proposes a possible South-South cooperation initiative on the digital economy as a step in the Global South's engagement with and integration into the digital economy while continuing the work of realizing the SDGs.

Acknowledgment

Digital technological innovation is injecting unprecedented momentum into the global economy and is propelling the economy and society towards a more intelligent and smarter era. Practice has proved that digital technology can be applied in the least developed regions of the world, providing more convenient trade, financial and social services. Strengthening cooperation in digital technology as well as intelligent science and technology among developing countries is becoming increasingly important and should be a key area of SSC in the future. To this end, the FCSSC and the UNOSSC jointly organized the preparation of the 2008 South-South Cooperation Report: South-South Cooperation in a Digital World, which will be jointly released during the 2019 commemoration of the fortieth anniversary of the adoption of the Buenos Aires Plan of Action for Promoting and Implementing Technical Cooperation among Developing Countries (BAPA) at the Second High-level United Nations Conference on South-South Cooperation (BAPA+40 Conference), with a view to expanding the field of digital technology and the digital economy. South-South cooperation will help the United Nations to achieve its sustainable development goals for 2030 and support through knowledge products.

The 2008 annual report has been organized, researched and written by the Sixth Industrial Research Institute, Fudan University, as executing unit and funded by the South-South Education Foundation.

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In order to better organize the preparation of this report, we organized four seminars in Beijing, Shanghai and Hong Kong Special Administrative Region.

On 10 December 2018, the 2018 South-South Cooperation Financial Forum held in Hong Kong, China, focused on "South-South Cooperation in a Digital World". In the process of report writing, experts and scholars were invited to discuss the topics of the report, the initial writing plan, and work on the first draft as well as the later revision of the report. I would like to thank the experts and scholars who participated in the seminar for their valuable advice and wisdom.

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Wu Zhong, Director-General of the Finance Centre for South-South Cooperation
Xiaojun Wang, Deputy Director for Programme and Operations, United Nations Office for South-South Cooperation

Abbreviations

AAU	Association of African Universities
ADB	Asian Development Bank
AI	Artificial Intelligence
APEC	Asia Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
ASW	Asian Single Windows
AU	African Union
B2B	Business to Business
BAPA	Buenos Aires Plan of Action
BATFB	Bay Area Trade Finance Blockchain Platform
BPO	Business Process Outsourcing
BRI	Belt and Road Initiative
C2C	Customer to Customer
CHA	China Health Aid
CICO	Cash In, Cash Out
CIECC	China International Electronic Commerce Centre
CMT	China Medial Team
CNY	Chinese Yuan
CPEA	Cross-Border Privacy Enforcement Collaboration Mechanism
EGDI	E-Government Development Index
ERCA	Ethiopian Revenue and Customs Authority
eWTP	Electronic World Trade Platform
EU	European Union
FCSSC	Finance Centre for South-South Cooperation
FOCAC	Forum on China-Africa Cooperation
GDP	Gross Domestic Product
GFI	Global Financial Integrity
GPEN	Global Privacy Enforcement Network
GSBN	Global Shipping Business Network
HKMA	Hong Kong Monetary Authority
HMQ	Humaniq Tokens
ICT	Information and Communications Technology
IFAD	International Fund for Agricultural Development
IFF	Illicit Financial Flows
IoT	Internet of Things
IoV	Internet of Vehicles
IMF	International Monetary Fund
ITU	International Telecommunications Union

LoC	Letter of Credit
KEBS	Kenya Bureau of Standards
LEX	Lazada Express
LDC	Least Developed Countries
LNG	Liquified Natural Gas
MFA	Mall of Africa
MNC	Multinational Corporation
mPOS	Mobile Point of Sale
MOOC	Massive Open Online Course
MSME	Micro, Small, and Medium-Sized Enterprise
NGO	Non-Governmental Organization
NSC	North-South Cooperation
NSW	National Single Windows
OECD	Organization for Economic Cooperation and Development
OOCL	Orient Overseas Container Line
P3	Public-Private Partnership
PoC	Proff of Concepts
SADC	Southern Africa Development Community
SDG	Sustainable Development Goal
SDG-F	Sustainable Development Goals Fund
SIRESS	SADC Integrated Regional Electronic Settlement System
SME	Small Medium Entreprises
SSC	South-South Cooperation
SWIFT	Society for Worldwide Interbank Financial Telecommunication
TCIP	Transparency Communication and Infrastructure Programme
TrC	Triangular Cooperation
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and social affairs
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNOSSC	United Nations Office for South-South Cooperation
USD	United States Dollar
VC	Venture Capital
VOIP	Voice Over Internet Protocol
WB	World Bank
WCO	World Customs Organization
WFP	World Food Program
WIMT	WhereIsMyTransport
WTO	World Trade Organization

CHAPTER I

Introduction

1.1. The Digital Economy, South-South Cooperation, and Sustainable Development

In the process of the transformation of the global economy toward digitalization, developing countries, especially the extremely underdeveloped countries, should not be left behind. So, what is and what will be the impact of the digital economy on the Sustainable Development Goals (SDGs)? Economic development, a cornerstone of the achievement of the 2030 Agenda for Sustainable Development, may well be deeply facilitated by the developing world's burgeoning technology sector, particularly small and medium-sized enterprises engaging in the platform economy and digital trade. Indeed, the digitalization of services, including via smart contract and the blockchain, a distributed ledger technology, equally offers opportunity for improved access and participation in the global (digital) economy by underprivileged populations.

This introductory chapter will further investigate the status quo of digital economic development in developing countries, as well as the status quo of South-South cooperation in the digital economy. Contextualizing the chapters to come, the author will ask whether South-South cooperation has impacted and been fundamentally and transformatively impacted by the digitalization of financial services, and the birth of a Digital Society unbound by geopolitical borders. On the latter, in terms of achieving the SDGs, can the Digital Society promote cooperation between countries in the Global South?[1] The chapter will conclude with consideration of several other broad questions, providing context for discussions to follow. First, what kind of opportunities will the digital economy bring to the economic and social development of the Global South and what will be the challenges faced by developing countries? Can integrated applications of the digital economy naturally provide a path to the SDGs, and if not, what interventions are needed? This chapter aims to analyze the above questions and explore how to strengthen South-South cooperation in digital technology and digital economy in the digital world and promote the achievement of the UN's sustainable development goals.

1 Author: Hany Besada, United Nations Office for South-South Cooperation. This report treats Global South as a socio-economic and loosely geographical concept referring to developing countries as a whole, which are those with a Human Development Index – measuring three dimensions of human development, namely a long and healthy life, access to knowledge, and a decent standard of living – of less than 0.9, with developed countries having achieved a score of 0.9 or higher (see UNDP, 2009).

1.2. Digitalization and the Fourth Industrial Revolution

Beginning in the 1980s and changing exponentially thereafter, the human experience in the "Digital North" has been ubiquitously digital. Countless numbers of people simultaneously exist in both physical and digital spaces. Researchers and observers have only begun to catalogue the impacts that digital technology[2] have had on lives. Indeed, people have become more technologically connected yet at the same time socially isolated. They have more information than ever before, but sometimes struggle to verify that information. Common tasks, such as shopping and transportation, have changed dramatically, resulting in the rise of new goods and service providers, often at the expense of traditional ones. For many, there is no more down time, with social structures and even physiologies changing accordingly (Richtel, 2010). Humanity has entered the algorithmic age, where algorithms – snippets of computer code – determine what people should know, where they should shop, and who they should love.

The digitalization process has facilitated the creation of new groups, self-representations, and content, all related to or driven by information and communications technologies. Today, a social movement, criminal investigation, or a trade war can begin on social media. At the same time, the Internet has become a place offering protection for existing cultures – global projects using technologies to save disappearing languages, stories, interviews, and art, ensuring that future generations will have access (Strochlic, 2018). Perhaps politics has been most obviously altered through this digitalization process. Prominently exemplified by the election of Barack Obama as president of the United States in 2008, social media outreach and the effective use of big data have become significant contributing factors in political change. Today, governments are digitizing their public services, as in the case of Estonia.[3] Others are using blockchain technology to store essential documentation, which improves transparency. Nearly every national government now has a digital presence.

However, disinformation campaigns have prompted some observers to ponder whether politics has been adversely affected and whether digital technology is likely to blame (Runciman, 2016). Perhaps in some not too distant future, political campaigns will be run entirely by artificial intelligence. In any case, humanity has become digital, which has tremendous implications. In perhaps no other aspect of human experience has this been more felt than economics, with the advent of the digital economy, which is singular and global.

Developing in parallel with the Digital North is the Digital South, which refers to developing countries of the Global South that have relatively little engagement with

2 Digital technology is used in this chapter as a catch-all term that encompasses all new technology that derives function from digitized information or computer-driven processes. Within this categorization, we include information and communications technology.

3 Estonia's digitalization project is called e-Estonia, in which all regularized public services have been digitized and linked across a single accessible platform.

digital technology, if any at all, and thus the digital economy. Some initiatives hold great promise. For example, Kenya is the world's first country to issue a mobile-only purchasable bond, building on the success of the M-Pesa payment system. Nonetheless, there is a stark digital divide between the leaders of the North and the furthest behind in the South, one that will widen unless concerted action is taken. Although closing the digital divide has been difficult thus far, the United Nations Conference on Trade and Development (UNCTAD) argues that the exponential changes that come with digital technologies, which underpin the digital economy and more broadly the Fourth Industrial Revolution,[4] are contributing to closing it quickly (Kituyi, 2018). The Fourth Industrial Revolution is the advent of cheap and effective production of digital technologies embedded in everyday life, including cloud computing, telecommunications, big data, and the Internet of Things – so-called frontier technologies, making access to information, efficiency in production, and rising education and incomes accessible to the world's poor. However, all of this brings about unintended consequences, such as detrimental impacts on the environment and climate change.

At its very core, digitalization is the process of making functions and activities cheaper and easier to complete. At the same time, as with all things, there are risks that must be faced, especially by the Global South. First, the Fourth Industrial Revolution could bring with it worsening unemployment, particularly through automation, artificial intelligence, and robotics, in tandem with policy environments that do not retrain workforces away from the primary sector. Second, it may continue the process of wealth concentration already being seen across the developing world (Hamann, 2018). Particularly in respect to the latter, embodied by the technology start-up industry, there remains considerable disparity between funding availability for entrepreneurs in the Global South and those in North America and Europe. Third, this process and period may be a counterforce to the protection of human rights and freedoms, exemplified today by the debate over privacy versus security.

As World Economic Forum Founder and Executive Chairman Schwab (2018) argues, humanity simply does not have the luxury of time when it comes to shaping the digital economy and the Fourth Industrial Revolution. In other words, the rules, policies, institutions, support mechanisms and catalyst tools created today will inevitably be out of date tomorrow. Schwab recommends what he terms to be "agile government", one that mirror the fluidity, speed, and malleability of the technologies it wishes to govern, doing so through a collaborative approach with all relevant and impacted stakeholders. For the Global South, such an aspiration may not be possible due to the challenges and

4 Contemporary human history has been divided by some into industrial ages or revolutions. The First Industrial Revolution was seen as the shift in human economic existence from agrarian to urban living, coupled with the rise of factory production. The Second Industrial Revolution was a period of growth for existing industries. The Third Industrial Revolution was the advancement and rise of digital technologies. The Fourth Industrial Revolution, proposed by Schwab (2016), is the embedding of those advanced technologies in every facet of society.

requirements of local contexts. For this reason, South-South cooperation may be more relevant for the digital economy than it has ever been before. As collaboration can readily reduce the needed material and human resource investments required to achieve exponential changes, South-South cooperation may well prove to be a critical factor in developing appropriate and measured responses to the Fourth Industrial Revolution.

For the United Nations, South-South cooperation is a means, method, and series of tools by which countries of the Global South collaborate among each other in areas of economics, social affairs, culture, environment, politics, and technical development (UN, 2018a, 3). It requires the active participation of all sectors, including civil society, public institutions, academia, and industry, among others, and is managed by Global Southern countries themselves. South-South cooperation endeavours to create equality between countries, based on shared values, mutual interest and understanding; a horizontal relationship that drives the approach's comparative advantage. According to the UN, SSC "is a participatory process that promotes the creation of functional development solutions under similar cultural and social circumstances, reflects convergent political and strategic interests and taps locally available capacities and assets" (2018a). South-South cooperation is not a replacement for traditional donors, but a means to overcome the structural challenges pervasive within development practice by acting as a complementary solution and toolset.

Going forward, the digital economy is potentially the largest and most important opportunity for dynamic change in sustainable development worldwide. Particularly for the Global South, it creates the tools for achieving the SDGs, however the aforementioned risks must be acknowledged and addressed effectively by governments, private sector partners, international organizations, normative leaders, and the general public, whether that be through unified national strategies, multilateral frameworks on digital economy, support for small and medium-sized enterprises, or harnessing the benefits of digital commoditization. This chapter proceeds with a literature review on the digital economy and then covers its connections to the SDGs and South-South cooperation and its possibilities and potential for SDG implementation along their economic, social, and environmental dimensions. A special section introducing the Digital Society sketches the parameters of an overlooked though vital opportunity within the digital economy. Afterwards, opportunities and challenges of the digital economy for South-South cooperation and capturing digital opportunities in South-South cooperation for SDG promotion are outlined. The chapter concludes by contextualizing the chapters that follow.

1.3. The Digital Economy – Reviewing What We Know

1.3.1. Defining the Digital Economy

Perhaps not unexpectedly, the digital economy is a term replete with a host of definitions.

The International Monetary Fund argues that in a narrow conceptualization, the digital economy is understood as online platforms and the activities that arise solely from those platforms, though, from a broader perspective, it can include all activities that use, exist because, or come into contact with digital data (Reinsdorf and Quirós, 2018). According to a report by the Asian technology company Huawei, the digital economy today is worth approximately USD 12.9 trillion, with an expected growth to USD 23 trillion by 2025 (Huawei, 2018). Tapscott (1996), one of the original visionaries of the digital economy, notes that it encompasses some 12 unique characteristics: focus on creating content and knowledge; said knowledge is stored in a digital form; the possibility of converting physical items to virtual items; traditional structures give way to flexible work environments; the advent of deep, multi-level integration; disintermediation; it hallmarks the convergence between computing, communications, and content; it is based on innovation driven by information and communications technology (ICT); it leads industry away from mass production and toward mass customization; the sense of immediacy by customers; globalization; and, some discordance or disinterest in sectoral and process disruption. Part of the challenge in defining the digital economy is the speed at which the sector is changing – what is relevant today may not have as much salience tomorrow.

The Bureau of Economic Analysis at the United States Department of Commerce sees the digital economy as the valued output of three interconnected sectors, namely the enabling infrastructure needed to make digital actions possible, digital transactions, and the content that users create and access (Barefoot et al., 2018). There are even suggestions that we are already crossing into the space of a New Digital Economy, powered by advanced robotics, automation, new data sources such as the Internet of Things, cloud computing, and artificial intelligence (ICT Policy Section, 2017). Varian (2016), Chief Economist at Google, argues that the above Fourth Industrial Revolution technologies impact economic sectors and activities in at least five ways: data collection and analysis, or the significant augmentation of how much data firms and companies are able to collect; personalization and customization, particularly having transactions for goods and services optimized for individual needs; experimentation and continuous development, specifically the automation of systems and the use of big data to inform processes; contractual innovation in terms of verifying performance; and improved coordination and communication, especially using mobile technology. This report regards the digital economy from a more expansive lens: the collection of platforms, applications, functions, and economic activities occurring through or because of ICT and its respective infrastructure.

1.3.2. Defining the Digital South

Overlapping with the Global South, this report recognizes the use of the term Digital South. The term refers to countries' current states of digitalization, their pace of digitalization over time, and the resultant digital divide between the Digital North and South, which denotes the differential in ability to engage with the Internet and, as a consequence, the digital economy. The Digital North and South can be conceptualized using the report

Digital Planet 2017, which covers 60 countries (Chakravorti and Chaturvedi, 2017). Where a country rests on the digital divide is derived from four drivers of digital evolution: supply conditions, including access, transaction and fulfillment infrastructure; demand conditions, namely consumer capacity to engage, digital payment adoption, and device prevalence and density; institutional environment, both government and private sector; and opportunities to drive innovation and change. As is evident, the term "digital" differs from simply the use of technology.

Digitally advanced countries are divided between "Stand Outs", in other words those that are highly advanced digitally and demonstrate a high degree of forward momentum, and "Stall Outs", or those that are advanced, yet which face challenges in their ability and desire to sustain digital growth. Stand Out countries include the United Kingdom and Singapore, while Stall Out countries include the United States, Sweden, and South Korea. Countries developing digitally are either classified as "Break Outs", in other words those that score low in terms of digitalization but are growing and evolving quickly, and "Watch Outs", or countries that score low on digitalization and show limited growth prospects (Chakravorti and Chaturvedi, 2017). China, Malaysia, Saudi Arabia, Kenya, and Russia lead the Break Out countries, while Slovakia, Slovenia, Hungary, Greece, Spain, South Africa, Thailand, Peru, Egypt, Pakistan, and Algeria are Watch Out countries according to the Digital Evolution Index.[5]

For countries in these latter two groups, which comprise the "Digital South" (see Chakravorti, 2018), a number of trends reflect differences from the Digital North. First, populations in the Digital South are spending more time online – particularly through mobile Internet. Second, they are pervasively seen as digital optimists, believing that technology harbours opportunities for sustainable growth and development. Third, while in years past countries experiencing rapid growth in digitalization were more trusting of those tools, that correlation is now changing. Digital Southern countries are now significantly warier of their information online, how it is collected, sold, and used by governments and private-sector actors. Fourth, while the Digital South is increasingly using social media as a news source, rates are considerably lower than in the Digital North, understood as the Stand Out and Stall Out countries. Finally, there appears to be an increased willingness in the Digital South to trade personal data for services (Chakravorti, 2018).

Yet, there are many countries that are not part of any of these groups. In 2017, an estimated 84.4% of households in developed countries, 42.9% in developing countries, and 14.7% in

5 According to its authors, "the Digital Evolution Index uses a total of 108 indicators to measure the state and quality of digitalization in a country. It is structured at four levels: indicators, clusters, components, and drivers. Indicators are data points that answer a specific question. Clusters are a statistical grouping of indicators that are normalized, scaled, and weighted to create standardized values for the purposes of analysis and comparison; they combine and capture information from several indicators to illuminate a particular aspect that impacts digitalization … Combinations of clusters roll up to form components, which are the building blocks for the drivers. Components are built to provide a comprehensive understanding of factors that shape and define the drivers" (Chakravorti and Chaturvedi, 2017).

the least developed countries had access to the Internet, with the digital divide between developing countries and least developed countries widening. Regionally, Europe had the highest share of households with access at 85%, while the Arab States and Asia and the Pacific had just below half and Africa had 18%, although rates have been increasing since 2011. Overall, only a little more than half of the world's households – approximately 53.6% – had access to the Internet, with the number of individuals using the Internet exceeding 3.5 billion, or 48% of the global population, and digital gender gaps evident in every case except for the Americas (ITU, 2017a; see ITU [2017b] for specific country profiles with country indicators, comparisons with their region and the world, and details about mobile services, fixed services, and government policy). For the Global South, mobile-cellular networks are increasingly pervasive and there has been rapid growth in mobile-broadband services (ITU, 2017a). Importantly, it follows that almost half of the world's households have never used the Internet and on average close to 20% of the population in developing countries do not use a mobile phone (ITU, 2017). Such statistics can be related to broadband affordability, with the relative costs of being connected to the Internet underpinning the digital divide (Ojanpera, 2018). Not having Internet access at all is a complete lack of digitalization, but the term Digital South must encompass these countries, in line with the SDG principle to leave no one behind.

The status quo in the Digital South, including countries that have not begun digitalization, is primarily characterized by relatively weak digital infrastructure – from networks to clouds – and poor institutional quality, which hold countries back. An area of focus should be fostering better institutions that can help nurture and sustain innovation. Improving momentum requires improving access to the Internet by increasing the number of mobile phones with Internet access (Chakravorti and Chaturvedi, 2017). These momentum-related prescriptions also apply to countries that have not begun digitalization – indeed, they are necessary first steps. As the digital economy encompasses more traditional economic sectors, development at different speeds will be seen between the Digital North and South unless digitalization is prioritized so that the Global/Digital South will not fall further behind. Trends and outlook suggest that digitalization in the Digital South and North is not converging (see OECD, 2017; and Graham, et al., 2018). One trend to watch is the new inequalities that will be created by the difference in access to second-generation (2G) mobile networks in developing countries (see ITU, 2017a) and fourth-generation (4G) as well as incoming fifth-generation (5G) networks in developed countries, which have relatively higher system capacities and faster speeds than 2G networks.

The sum of the above is that digital economy penetration is increasing in some of the Digital South, but that it is being viewed, used, and interacted with differently. Indeed, there are tremendous opportunities and benefits that can come with the digital economy as it pertains to sustainable development. According to the International Centre for Trade and Sustainable Development, the digital economy can "have significant competitiveness and productivity-boosting opportunities related to access to digital products and services that can help optimise processes and production, reduce transaction costs, and transform

supply chains […] all of this enable firms to participate in global value chains and directly access customers in foreign markets" (Arbache, 2018). Customers are then able to access a wider range of products and services, while leveraging digital technology for innovation, entrepreneurship and job creation (Arbache, 2018). These benefits are only the beginning. Of course, digital technologies equally bring prospective challenges and issues to be overcome. One of the most promising ways to address both opportunities and risks associated with the digital economy is South-South cooperation.

1.4. South-South Cooperation and the Digital Economy

The entry of the Digital South into the digital economy may well be forged through improved SSC, especially regionally. Digital industrialization is the overarching objective: "industrial digitalization in a country cannot happen on its own, especially given the limited existing digital capacities of developing and least developed countries. South-South cooperation, in the form of regional digital cooperation, is essential for digital industrialization of the South. This regional digital cooperation can be an additional element in the on-going regional integration processes" (Banga and Kozul-Wright, 2018). SSC related to the digital economy has been changing rapidly in recent years. Its scope of has extended beyond technical cooperation and knowledge exchange to include trade, investment, infrastructure and connectivity as well as coordination of policies and development strategies.

In line with strengthened institutionalization of collaborative efforts including impact assessments, SSC has become an established modality in regional and global development policy dialogue and initiatives. For example, India's new initiatives, specifically Digital India and smart cities, offer opportunities to broaden its cooperation with partner countries. China's Belt and Road Initiative (BRI), according to official sources, with over 100 countries expressing interest in partnership, will drive South-South cooperation on promoting policy coordination, connectivity of infrastructure and facilities, unimpeded trade, financial integration, and closer people-to-people ties, the latter achieved through ethnic reconciliation, religious dialogue, collaborative consultation, and public diplomacy (UN, 2017). The digital economy will no doubt be a large part of that major undertaking.

UNCTAD proposes a 10-point agenda with which developing countries can overcome the extreme difficulties of digital industrialization and equitable entry into the digital economy. First, there is a suggestion that continental and regional blocs can collaborate on infrastructure development, not simply physical infrastructure, but cloud computing and data collection and use as well. For example, the European Union (EU) has made inroads in developing common digital systems across their membership, termed the Digital Single Market. Second, there are considerable opportunities for countries to cooperate on e-commerce and digital payments, particularly in the development and harmonization

of policies regarding rules for consumers and businesses, consumer protection, digital content, geo-blocking, cybersecurity, and cross-border payment systems. The African Union (AU) has begun conversations in this regard for the establishment of a pan-continental e-commerce strategy (Banga and Kozul-Wright, 2018).

Beyond these areas, UNCTAD proposes that South-South cooperation should occur in the establishment of a digital single market, in sharing best practices for e-government, in building smart cities, and promoting innovation in digital technology, the path to which will be explored throughout this report. Collective engagement in these areas could not only drive further utility of the digital economy for the Digital South, but it could equally "further the on-going regional integration efforts of the developing countries, help the regions to make substantive progress in digital industrialization as well as prepare developing countries [to]… improve their abilities to take advantage of the rising opportunities in this new phase of industrialization" (Banga and Kozul-Wright, 2018). Indeed, the digital economy is an opportunity to extend beyond concepts of ICT for Development and drive local-owned economic growth through entrepreneurship, education, innovation, and technology. It extends "development" away from provision of goods, services and support from the Digital North to the South but facilitates the latter's ability to do so on its own, and on its own terms.

1.5. The Digital Economy and Sustainable Development Goals

The 17 SDGs established the roadmap for poverty alleviation, economic growth, environmental sustainability, peace and justice, among other goals. In order to achieve these benchmarks, we need to be innovative, creative, and adaptive to changing contexts and global environments. Technology, specifically ICT, will be essential in this regard; leveraging the Fourth Industrial Revolution as one of two means of implementation for achieving the SDGs (Mohieldin, 2018). For nearly every goal, technology and the digital economy can affect positive progress if leveraged appropriately. For the developing countries that are furthest behind, SDG 1 on no poverty and SDG 5 on gender equality are most pressing. If a country needs a framework for initiatives to boost the digital economy, the one that should be used is the SDG framework, the guiding principle of which is to leave no one behind. Indeed, the digital economy is cross-cutting, existing as a potent economic and development tool that can be harnessed for the achievement of the SDGs, without specific emphasis on one goal over another.

1.5.1. Poverty Alleviation

According to economic analysis, the digitalization of economic processes, activities, and value could bring as much as a USD 4.1 trillion increase in Gross Domestic Product (GDP) among developing countries, using the opportunity of technological leapfrogging to

engage quickly and effectively with the digital economy (Mei Chang, 2015). The digital economy is a vehicle for improving education access, increase employment opportunities, and linking Small Medium Enterprises (SMEs) in the Global South to international markets, previously difficult if not impossible for generations without ICT (Adhikari and Dorji, 2017). SDG 1, which regards the ending of poverty in all its forms everywhere does note the importance of using "appropriate new technology", although no specific indicator tracks such technology.[6]

To achieve poverty alleviation, a number of considerations should be broached. Mei Chang (2015) suggests that the use of digital economy for achievement of SDG 1 will require catalyzing connectivity, enabling digital workforces through training and education, and increasing accessibility of digital financial services. Historically, the world's poor have been trapped in a poverty cycle that perpetuates itself through a lack of access to financial services and a determined disinterest on the part of business to provide their services to this population. Provided that the challenges of the digital divide can continue to be broached, the digital economy holds the promise of reducing costs of financial intermediation, providing payment services for cashless economies, and offering access to loans and equity for those whom have never been afforded this before (Ozili, 2018).

Adhikari and Dorji (2017) add that improving competition in the telecommunications sectors in countries of the Global South, easing the costs of doing business through e-government programmes, expanding Internet access, the commitment of political capital, identification of priority areas, and blended finance and partnership initiatives are all essential for digital economy impact on the SDGs. Focusing on digital finance, others argue that the increased use of biometrics, augmenting direct deposit services, ending the use of cash payments for social benefits, and ensuring that customers have access to digital tools that are cheaper and more effective than physical counterparts are needed as well (Klapper and Hess, 2016).

But to engage the digital economy for achievement of the SDGs, countries, governments, the private sector, and international organizations must collectively broach the lingering digital divide, what the World Economic Forum terms "Digital Poverty". While ICT access is increasing globally, including in Africa where rates of mobile phone adoption almost surpass those in North America, this is not ubiquitous with broadband or Internet availability, which is still lacking. According to Pepper, at Cisco's Global Technology Policy unit, "Broadband is an income multiplier… unconnected countries and people are being left behind" (Cann, 2015). The Digital Economy alone is not enough for poverty alleviation; both its potential and its accessibility must be inclusive (Mehta, Pazarbasioglu, and Irigoyen, 2018). As referenced previously, the problem may not be one of job creation, but of good job creation; it is expected that while the digital economy will offer unparalleled

6 See: United Nations, "Sustainable Development Goals", https://sustainabledevelopment.un.org.

opportunities to access new employment, this will not be enough to lift populations out of poverty (Wladawsky-Berger, 2015). However, with three billion new users expected to come online in the next decade, coupled with the decreasing cost of service provision which had historically been a significant impediment to the private sector working with the poor, opportunities to anticipate and pre-empt poverty-enabling employment do exist.

1.5.2. Gender Equality

Under SDG 5: Achieve gender equality and empower all women and girls, target 5.B is "Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women" and indicator 5.B.1 is "Proportion of individuals who own a mobile telephone, by sex".[7] As has been identified by several nation states, notably Canada with its Feminist International Assistance Policy, establishing gender equality and empowering women and girls is an essential means by which to achieve overall poverty reduction and development impact. Despite progress being made, there continues to exist what the OECD terms a "digital gender divide" (OECD, 2018). According to recent statistics, some 250 million fewer women online and 200 million women without mobile access as compared to men, the majority of whom live in rural areas in developing countries (OECD, 2018). And yet women are key to the success and proliferation of the digital economy.

Indeed, gender-diverse companies are estimated to be 45% more likely to improve market share, obtain 53% higher financial returns, and are 70% more likely to successfully capture in new markets (AT Kearney, 2015). Others have proposed that when companies tap into women in their working environments, the likelihood of success for new products and services can be as high as 144% (AT Kearney, 2015). The McKinsey Global Institute estimates that if barriers were removed that prevent parity between women and men's participation in economic systems, USD 28 trillion in value would be added to the global GDP in a decade (Chakravorti, 2017). Similarly, there appears to be a correlation between higher rates of digital literacy among women and their corresponding equality in the workplace (Jamann, 2017).

The digital economy needs women. But it can also be an opportunity for women, a versatile and malleable tool that provides incalculable opportunity for economic contribution, financial reward, and job creation. Research tends to congregate around a number of consequence pillars, those traditionally cited results of women's equal and full participation in the digital economy. It can provide worldwide market access for women to sell goods and services, offering opportunities to engage in entrepreneurship. ICT writ

7 Terminological note: A smartphone is a device that is able to access and use the Internet through a wireless signal. A mobile telephone is generally unable to do so, being limited to voice and text messaging functions.

large is a functional method of performing community building and political organization, enabling the quick and diffuse spread of women's ideas and voices, particularly important when the latter is deployed for influencing more conducive policy regarding the digital economy (Hilbert, 2011). UNWomen, for example, has used ICT tools in this regard: providing mobile phones to women to report safety concerns and to access resources on gender-based violence; developing an international platform where women can source information on local, regional and national politics and candidates; and, by creating an economic "knowledge gateway" to ensure that female entrepreneurs have the tools they need to succeed in business and industry (Clark, 2013). Gender equality is multifaceted when overlaid on the digital economy. Equality is that of access, the ability for women to participate, formulate, define, and ultimately lead the digital economy. It is equality of digital literacy, the ability to utilize ICT effectively. It is equality of opportunity to do more.

1.5.3. Means of Implementation

Means of implementation are largely collected under SDG 17: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development. The most important are the targets and indicators related to technology. Target 17.6 is "Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism", while indicator 17.6.1 is "Number of science and/or technology cooperation agreements and programmes between countries, by type of cooperation" and indicator 17.6.2 is "Fixed Internet broadband subscriptions per 100 inhabitants, by speed". Target 17.7 is "Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed", and the associated indicator 17.7.1 is "Total amount of approved funding for developing countries to promote the development, transfer, dissemination and diffusion of environmentally sound technologies".

As such, target 17.8 is to "Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology" and indicator 17.8.1 is "Proportion of individuals using the Internet". Importantly, the SDGs do not broach the digital economy per se, though they do highlight the building blocks with which national governments can use to build technology sectors and integrate them with the (global) digital economy, which in turn will play a key role in financing and achieving the SDGs. This report takes the step to link the digital economy to the SDGs through South-South cooperation.

1.6. Possibilities and Potential Impact of the Digital Economy on the SDGs

This report aims to answer a number of interrelated questions associated with the digital economy. First, what kind of opportunities will the digital economy bring to the economic and social development of the Global South and what will the challenges be for developing countries? And second, can integrated applications of the digital economy naturally provide a path to achievement of the SGDs, and if not, what interventions are needed? In other words, what are the possibilities and potential impact of the digital economy on the SDGs? The SDG period is a time when digitalization is spreading exponentially, and the latter could have a defining impact on the former if properly linked.

For the Global South, the digital economy will bring opportunities for new job creation, accelerated development, improved domestic resource mobilization, targeted investment, and hopefully increased economic and social equality through information exchange. On the last note, although evidence of such information exchange exists in the contexts of North America and Europe, data are sparse in the Global South, suggesting a necessary space for knowledge creation and information diffusion, through this report and others like it. The main mechanisms to capitalize on these opportunities will be the Platform Economy, Digital Trade, Smart Contracts, Digital Finance, and Smart Society. Integrated applications of the digital economy – in other words, overlapping of the mechanisms – will boost SDG implementation by making it easier and achievement by making it clearer, with key interventions being increasing access to the Internet through digital infrastructure, encouraging use of the mechanisms, and promoting the SDGs broadly.

Regarding new job creation, the Platform Economy will match skills with jobs and better communicate demand. According to Chapter 2 on the platform economy, the largest benefit for the SDGs will likely be within the economic dimension. The major area of focus must be leapfrog development through latecomer advantage via usage of mobile phones and adoption of mobile Internet. At the local level, the platform economy improves costs and convenience through virtual marketplaces, brings market participants together, and creates new added value. Importantly, mobile payment platforms can facilitate financial inclusiveness which benefits the poor. Regarding the social dimension of the SDGs, platform-oriented social services supported by digital technologies will influence implementation of SDGs concerned with social development. Specifically, e-education could boost the accessibility and fairness of education services, online medical care could narrow the healthcare gap between different countries in the Global South and between Southern and Northern countries, and blockchain technology could improve the aiming accuracy and efficiency of social aid efforts.

For accelerated development, Digital Trade should increase efficiency in terms of browsing and comparing goods and services and shipping where applicable. Introducing the option

will change developing countries and least developed countries irrevocably. According to Chapter 3 on digital trade, the benefits of cross-border e-commerce are exclusively within the economic dimension. Specifically, digital trade provides more growth opportunities for small and medium-sized enterprises in the Global South, more opportunities to innovate business models, and accelerate the growth of localized platforms and increase opportunities for technical and capital cooperation. Notably, small and medium-sized enterprises from developing countries have the options to integrate with global value chains and pursue business opportunities brought on by globalization.

In Chapter 4 on smart contracts, the largest benefit for the SDGs will be solely in the economic dimension. Smart contracts, which execute automatically when certain conditions are met, have started to facilitate international trade through a wide range of benefits, such as speed and efficiency, addressing fraud risk, easier access to finance and reduction in various including financing and administration. Most smart contracts are powered by blockchain. Countries of the Global South can benefit through fairness with which value added is shared among various participants and access is provided to international markets for small entrepreneurs from developing countries. Blockchain-based platforms have great potential to enable and facilitate smart oversight, where government institutions rely on an independent agent to verify regulatory compliance in international trade. They could also ensure that environmental and social goals are met, in line with the SDGs.

More than three years into the SDGs, more finance is clearly necessary. Illuminating research has been done on "the disconnect between the global dialogue on SDG financing and the realities on the ground" and "the importance of political will to take the necessary measures for implementing the 2030 Agenda" (Bhattacharya, 2018). In Chapter 5 on digital finance, emerging financial technologies, or FinTech, are making breakthroughs in certain developing countries. Digital finance has the widest scope to address the social and economic dimensions of the SDGs by improving financial inclusion and thereby economic development – financial inclusion has been identified as an enabler for seven of the 17 SDGs. Given the large number of people who are unbanked and enterprises that cannot access credit, digital platforms for digital transfers and lending are increasingly used, and people who have more time can be more productive. Businesses, financial-service providers, and government institutions could also benefit from increased productivity and efficiency – as with domestic resource mobilization and reducing the size of the informal economy in government's case – as well as greater investment throughout an economy, including remote rural areas. Introducing digital finance given mobile phone ownership and connectivity is relatively straightforward, although reaching the critical mass at high speed for significant changes may be difficult.

Chapter 6 on Smart Society focuses on SDG 11 on sustainable cities and communities, meaning that the social and environmental dimensions are prioritized in this case. Given the widespread problems experienced around with world with urbanization, the

development of cities requires smart social management and services. Introducing digital technology can contribute to solving various social development problems, such as an Intelligent Transportation Management Platform to replace chaotic traffic and congestion, distance education and medical care to address uneven distribution of educational and healthcare resources, and social media to alleviate social isolation and exclusion in rural areas. Strengthening trends toward inclusive and sustainable urbanization in all countries using digital technology drives the Smart Society concept.

For Chapter 7: The major challenges for the Digital South, which may neither be intuitive or covered in the proceeding chapters in this report, are the risks involved with digitalization. There is some evidence that much of the research on digitalization may be overly optimistic in that there appears to be a disconnect between claims about the potential of digital technologies and the research based on their actual impacts (see, for instance, Friederici, et.al., 2017). As an example, there is some research on the transformations brought about by more connectivity on the value chains of tea in East Africa. Digitalization has imposed greater burdens on some of the smallholder farmers, who are producers subsisting on tiny margins – and so new costs such as these can serve to exclude them from markets rather than include them (Foster, et al., 2017; Foster and Graham, 2015a, 2015b). In general, developed countries appear to be more optimistic, while developing countries seem more cautious. Going forward, there must be more reflection – by governments, the private sector, digital workers, and Internet users themselves – on such disconnects and optimism must be tempered by a discussion of the risks involved from both the macro and micro perspectives, as well as possible disadvantages.

The hope is for increased economic and social equality through information exchange, which can be stimulated by the Digital Society. We are already seeing a plurality of economic, social, and environmental views with the adoption of digital, but what is needed is consequent transformations for a fairer world. The digital economy may be the missing piece of the puzzle that can complete economic, social, and environmental transformations. The Digital Society could facilitate these transformations by implementing and promoting the SDGs.

In terms of promoting the SDGs, can the Digital Society promote cooperation between countries in the Global South? Perhaps what is most important is having people learn what is at stake and changing perceptions from zero-sum to positive-sum games. The narrative is that we live on one planet and each country is affected by changes in other countries, though cooperation should lead to improved outcomes. Theoretical ideas include" the commons" and international relations literature on cooperation, however we are entering a new period where environmental outcomes are taking centre stage and perhaps must be emphasized through the individual's own eyes. That includes accessing the Internet to gain information to sharing experiences and ideas on social media to actually travelling to other places to gain appreciation. Money and physical presence are no longer holding people back to gain new experiences, although the poorest of the poor have obstacles

that must be the priorities of governments. Mobile phones and Internet access, while only the first steps to digitalization, are needed.

The objective should be to move from an information society to a knowledge economy, especially in Africa (Carmody, 2012), which could be achieved through the Digital Society. For example, to catalyze the creation of digital economy jobs, the International Trade Centre is building digital entrepreneurial skills in East Africa with expertise provided by its partners in India and Kenya. Its initiative SheGoesDigital provides Kenyan women with comprehensive training programme in social media and digital marketing, followed by industry internships (UN, 2018b). Regional development by linking Digital Societies should be a priority. An important aspect to consider going forward, especially across the Global South, is the need for regional monitoring and review mechanisms for effective implementation of the SDGs (Bhattacharya, 2016).

1.7. Opportunities and Challenges of the Digital Economy for South-South Cooperation

Like the digital economy itself, the literature on the digital economy is growing exponentially. The value added of this report is connecting the dots between the digital economy, South-South cooperation, and the SDGs. South-South cooperation could see its most effective application through the digital economy, while the digital economy's growth and trajectory can be guided through South-South cooperation, despite the fact that opportunities also present challenges. South-South cooperation is the framework through which the digital economy can be realized fastest since there are mutual benefits for developing countries, which should be a priority since the digital economy can boost economic outcomes and thus make South-South cooperation appear successful, and improved outcomes will reinvigorate South-South cooperation.

Chapter 2 on the Platform Economy focuses on imbalances in the development of the platform economy worldwide. Within this context, emerging economies must take the lead among developing countries to balance the influence of new technologies. There is huge potential for South-South cooperation in promoting the platform economy, especially to help push forward cross-border e-commerce and trade facilitation, and to bring benefits to the poor and promote inclusive and sustainable development. As for challenges, the rapid development of digital technologies may worsen inequality and create new gaps between Southern and Northern countries. The main challenges are weak digital infrastructure, insufficient human capital investment related to cognitive and social-emotional capital, technological inequality increased due to inadequate infrastructure and technology transfer, as well as independent innovation capacity.

According to Chapter 3 on Digital Trade, there are considerable opportunities and challenges in the digital economy for South-South cooperation. Digital trade is an

emerging cooperation mode for developing countries with great potential to catalyze deeper cross-border e-commerce cooperation, complement resource advantages, accelerate economic development, and enhance collective economic strength. However, the challenges are many: different Internet penetration rates, knowledge gaps related to digital trade, restrictions on cross-border data flow, logistical issues, problems concerning customs clearance efficiency, taxation systems, technical standards, lack of government-level technical cooperation, comparative insufficient rules on cross-border e-commerce. Actively promoting the rules conducive to digital trade, strengthening standards, and engaging in capacity building are paths forward.

According to Chapter 4 on Smart Contracts, actors from Northern countries have created blockchain-based platforms that are being used for international trade by an increasing number of actors from Southern countries – that experience could be applied to South-South cooperation. Smart contracts and smart oversight should improve the efficiency of international trade substantially. The benefits are mainly in the economic dimension, though conceivably the social and environmental dimensions could see benefits as well. The main challenges are the low level of technology diffusion in the Global South, which limits the maximum potential of blockchain-based platforms that tend to be combined with other technologies such as artificial intelligence and the Internet of Things, and a needed critical mass of participants with the ability and willingness to adopt such platforms before positive network effects can be seen.

In Chapter 5 on Digital Finance, there is potential for innovative business activities and increased financial connectedness, which could serve South-South cooperation including South-South financial cooperation. The opportunities for new economic opportunities, larger customer bases, and new markets are coupled with operational risks including fraud and cyber risks that must be tempered by regulations. Enabling savings can stimulate financial markets in developing countries, which can then become indicators of financial stability for investors in other countries.

Regarding Chapter 6 on Smart Society, strengthening South-South cooperation on Smart Societies builds on traditional cooperation involving flows and cooperation in the fields of finance and technology with a broader scope by using digital technology, including the exchange and sharing of infrastructure, information and data, network security, knowledge, policy, and other resources. South-South cooperation priorities are infrastructure, technology, data security, and policy cooperation, with guidelines being to follow the core principles of problem-oriented resource sharing, and practical effects. In order to build a Smart Society, it is acknowledged that what is needed is to combine advanced technology and other countries' experience with the existing local foundation and practical needs. Early overall planning and top-level design, attention to data and network security, improving human capital and focusing on cultural differences, and using multifaceted models and approaches – like relevant international and national cooperation agendas – are all essential to building a Smart Society.

As for Chapter 7, most importantly, more research must be conducted on the mechanisms through which digital technologies increase equality. Alongside innovation in digitalization must come innovation in labour protection in particular. Much has been said about the concept of introducing universal basic income alongside the advent of artificial intelligence, which replaces workers on a large scale, however innovative ideas are needed. These might include the Fairwork Foundation, which aims to create a fairer economy for platform workers based on the relatively successful Fairtrade Foundation (Graham and Woodcock, 2018), or broader strategies such as certification schemes, collective organization among digital workers, regulation, and even democratic control of online labour platforms (Graham, et al., 2017). With increasingly substantive research on the digital economy being done, conducting research on labour protection in the digital economy is essential and potentially widely impactful.

1.8. Capturing Digital Opportunities in South-South Cooperation to Promote the SDGs

South-South cooperation is broadly one of the means of implementation under SDG 17, where several means of implementation mention South-South cooperation as finance and technology transfer. Specifically, indicator 17.3.1 is "Foreign direct investments (FDI), official development assistance and South-South cooperation as a proportion of total domestic budget". Regarding technology, target 17.6 seeks to "Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism", while indicator 17.6.1 is "Number of science and/or technology cooperation agreements and programmes between countries, by type of cooperation", and indicator 17.6.2 is "Fixed Internet broadband subscriptions per 100 inhabitants, by speed". Importantly, regarding capacity building, target 17.9 is "Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the sustainable development goals, including through North-South, South-South and triangular cooperation", while indicator 17.9.1 is "Dollar value of financial and technical assistance (including through North-South, South-South and triangular cooperation) committed to developing countries".

South-South cooperation is not only finance and technology transfer – it is also, literally, cooperation in terms of digital technology and the digital economy, which can contribute to promoting the achievement of the SDGs. Indeed, there is substantive evidence indicating that South-South cooperation has immense potential to accelerate the progress of countries in achieving all 17 SDGs, especially through knowledge-sharing platforms that encourage mutual learning such as the Technology Bank for the Least Developed Countries (UN, 2018a).

Regarding UN agencies, South-South cooperation is regarded, specifically, as a core strategic approach to achieving and implemented the 2030 Agenda. The UN places particular emphasis on the facilitation of policy dialogues, which have worked to institutionalize South-South cooperation, "by exploring new directions, concepts and potential partnerships, and by informing the development of coherent policies". Other activities pursued by the United Nations in regard to South-South cooperation have included the development by the United Nations Institute for Training and Research of an online tool for business and governments to improve public-private partnerships particularly in the Global South (UN, 2017). The Sustainable Development Goals Fund has also embarked on the monitoring, evaluation and learning of South-South cooperation of programmes in several South Pacific island nations, confirming that these efforts have strengthened learning and technical capacities in participating states (UN, 2017).

The question is how to strengthen South-South Cooperation in a Digital World in an inclusive way – to benefit the greatest number of countries and people without excluding anyone – with the SDGs in mind. In tandem with the digital economy's potential impact on the SDGs, digital opportunities in South-South cooperation can promote the SDGs. Given the SDG targets and indicators mentioned above, key digital opportunities are: "South-South cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism". This needs to start with common terminology and a global mechanism, perhaps this would be most effective as a regional objective as well. Regarding the associated indicator, "Fixed Internet broadband subscriptions per 100 inhabitants, by speed", is a good metric, however leapfrogging is only possible with mobile phone subscriptions. As for the indicator "Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the SDGs, including through South-South cooperation", the digital opportunities in terms of capacity building for SDG implementation are those that connect stakeholders and foster partnerships, with government, the private sector, and civil society including philanthropic foundations.

1.9. Report Outline

In the process of the transformation of the global economy toward digitalization, developing countries, especially the extremely underdeveloped countries, should not be left behind. Therefore, what is and what will be the impact of the digital economy on the SDGs? Economic development, a cornerstone of the achievement of the 2030 Agenda, may well be deeply facilitated by the developing world's burgeoning technology sector, particularly small and medium-sized enterprises engaging the in the platform economy and digital trade. Indeed, the digitalization of services, including via smart contracts and

the blockchain, equally offers opportunity for improved access and participation in the global (digital) economy by underprivileged populations if their initiatives gain a certain critical mass.

The digital economy is changing how humanity lives and businesses operate, but more needs to be done to apply its benefits and face its challenges in the context of developing countries in the Global South. South-South cooperation must do more to conceptualize concrete processes and mechanisms to support sustainable development in developing countries. The chapters that follow outline them: The Platform Economy, Digital Trade, Smart Contracts, Digital Finance, and the Smart Society.

Following this introduction (**Chapter I**), **Chapter II** focuses on the Platform Economy, specifically South-South cooperation in digital and intelligent technologies, such as big data, artificial intelligence, robotics, the Internet of Things, and blockchain. Most countries of the Global South are inactive digitally, but some emerging economies are taking the lead in digital technologies and South-South cooperation could be promoted to enable developing countries to shift from a traditional economy to a platform economy and share global digital dividends. A focus is the development of the underlying digital economy infrastructure, such as Internet servers and services, mobile phones and mobile Internet, relevant associated e-commerce services like mobile payment, and online-offline integrated development of industrial parks and special economic zones. The importance of carrying out the transfer of technologies under the framework of South-South cooperation is emphasized.

Chapter III on Digital Trade analyzes the cross-border e-commerce of developing countries, specifically the trade in goods and services using digital transaction technologies. By cutting transaction costs, digital trade creates new and greater opportunities for small and medium-sized enterprises, thus enabling countries in the Global South to deepen technological and investment cooperation. By weighing the opportunities and challenges, it is clear that there is much work to be done in this area, however a multifaceted understanding of the Southern context during a period of rapid acceleration would help to conceptualize a clear work plan.

In **Chapter IV** on Smart Contracts, blockchain-based solutions for trade facilitation and smart oversight are described. Evidence from pilot projects and actual deployments demonstrates how such solutions have been launched to address challenges in the Global South, such as tracking value added among various participants to ensure fair wages across value chains, and requiring prerequisites like identification documents and bank accounts to participate in global trade. Cases such as tracking exported coffee to prove living-wage payments were made to farmers and creating an app that builds user profiles based on biometric data (such as facial and voice recognition algorithms) demonstrate how digital technologies being introduced in North-South trade can stimulate South-South trade in the near future.

Chapter V on Digital Finance details the role and trend of financial technology in South-South cooperation. Specifically, it examines the opportunity presented by the introduction of digital finance for boosting financial inclusion, which has varying repercussions for unbanked people, businesses, financial-service providers, and governments. By focusing on the financially excluded and small- and medium-sized enterprises, the case is made that additional economic growth can be unlocked in developing countries. With financing being a major issue for the achievement of the SDGs, and efficiency being a broad theme going forward, linking modern technology with modern finance broadens understanding of what is indeed possible across the Global South.

Chapter VI covers a people-oriented Smart Society. Aspirational for many developing countries, a Smart Society involves three phases: the invention of face recognition, mobile payment, and other special technologies provide breakthrough technological support; the combination and integration of similar technologies occurs in a certain field, which promotes its intellectualization; and the integrated application of smart transportation, smart education and health services, intelligent disaster emergency services, and social services and social governance such as smart government will gradually form smart communities, smart cities, and then Smart Societies. Digital technology evidently drives the intelligent transformation of a society in the process toward becoming a Smart Society.

Chapter VII focuses on how Internet connectivity impacts value chains and networks, specifically business process outsourcing in East Africa through the case study of Kenya. It examines if and how the Internet can enable development of an industry that is predicated on bridging geographical distances between low-income and high-income countries via ICT: the business process outsourcing sector. The choice of Kenya's business process outsourcing sector as a case study is related to the arrival of the region's first fibre-optic cables to the coasts of Kenya in 2009. This large-scale upgrading of Internet infrastructure has offered a unique opportunity to empirically examine the short- and medium-term effects of ICT on economic development, and also to compare visions and hopes with the realities that have materialized over the last five years. The chapter broadens the understanding of connectivity beyond Internet connectivity, in the sense of mere technology-enabled accessibility. It examines the more far-flung effects of the new technological infrastructure in East Africa by also scrutinizing changes in actors' social and conceptual connectivity as well as enablers that are complementary to Internet connectivity.

Finally, **Chapter VIII** provides an overview of the report and lays out the way forward in South-South cooperation for digital transformation. More populous and faster-growing developing countries, as well as developed countries, need to support other developing and low-income countries, while South-South cooperation can be a catalyst in enabling the digital economy to achieve the SDGs. To realize the pledge to leave no one behind, targeted policies at the national, regional, and global levels must focus on digitalization. In terms of South-South cooperation at the national level, digital industrial policies, data

regulation policies, e-commerce platforms, and financial infrastructure to promote digital finance should be prioritized. At the regional level, efforts can be built upon UNCTAD's 10-point South-South Digital Cooperation Agenda, regional integration agendas can help foster Smart Societies, and regional development banks can digitally advance members in ways that include establishing a Digital Development Fund. North-South technology transfers will remain important, and international cooperation, especially through the SDG Fund, is necessary to link digital technologies and services with helping countries progress with SDG implementation. The research is very interesting, and the timing is pre-emptive and therefore propitious, given the implied exponential changes.

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CHAPTER II

Platform Economy: South-South Cooperation in Digital Technology and Intelligent Science and Technology

2.1. Platform Economy: The Emergence of an Economic Development Model

The popularity of digital technologies such as big data, artificial intelligence (AI), robotics, the Internet of Things (IoT), and blockchain has resulted in a rapid transformation in business models of economic activities and even modes of social interaction. Driven by digital technologies, Northern countries have already realized ubiquitous interconnectivity. Such connections not only take place in manufacturing and commercial activities, but also penetrate every aspect of social interactions. However, most countries in the Global South—except for some emerging economies taking the lead in digital technologies—remain inactive digitally. Against the backdrop of a widening North-South digital divide, it becomes increasingly vital to promote South-South cooperation in digital technologies and intelligent technologies and enable countries in the Global South to shift from a traditional economy to a platform economy and share global digital dividends.

In the course of the digital revolution that is sweeping across the globe, the platform economy, which is based on digital technologies and intelligent technologies, has become an economic development model that is leading future trends. The platform economy refers to the economic and social activities facilitated by data technology platforms and platform business models. The development of digital economy infrastructure including the number of Internet servers installed, the popularity rate of mobile phones and the subscription volume of Internet services, as well as the acquisition of relevant services, is a prerequisite for the platform economy. In the past decade, the emphasis on the development of infrastructure and special economic zones has been considered as an important measure for South-South cooperation to help the economic lift-off for developing countries. As we promote transport infrastructure connectivity of countries in the Global South, we need to pay greater attention to their digital-economy infrastructure connectivity in the era of digital economy. Similarly, when helping developing countries build industrial parks and special economic zones through South-South cooperation projects, we cannot merely copy the experiences of human society over the past decades. We need to combine the digital economy and intelligent technologies and promote an online-offline integrated development of those industrial parks and special economic zones.

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From the perspective of economics, the digital revolution has several essential characteristics, one of which is that Moore's law[8] about integrated circuits is transforming into a Moore's law for data. That means the data volume used by human society is witnessing exponential growth. Correspondingly, digitalized knowledge and information become new productive factors and important strategic resources driving economic and social development. The platform economy has fostered a new industrial organization pattern that differs from enterprises' vertical or horizontal integration management strategies. Likewise, virtual reality and online communities form new social networks and spaces, bringing changes to education, healthcare, learning and social communication.

Despite the huge North-South divide in the development of platform economy, it is important to note that even developing regions such as Sub-Saharan Africa have cultivated platform companies like Jumia, Konga and M-Pesa. Some of them provide e-commerce services, and others offer financial services such as mobile payment. It has proven that platform companies are able to create network effects and size effects in the least developed regions by providing convenient trading and financial services.

Promoting the cooperation of developing countries in digital technologies and intelligent technologies is playing an increasingly significant role in South-South cooperation. In fact, it is supposed to be a key part of South-South cooperation. In terms of the platform economy, South-South cooperation should prioritize the following aspects: First, governments should start with the connectivity of underlying infrastructure framework of the digital economy, and Internet firms should focus on innovation of business models; Second, the transfer of digital technologies should be carried out under the framework of South-South cooperation; Third, investment in human capital with advanced cognitive skills and social emotional skills should be increased.

2.2. The Essential Nature of the Digital Revolution

Throughout human history, technological revolutions have served as the cornerstone for scientific advancement and social progress. From steam engines to electricity, and then computers and information technology, every technological revolution could foster the liberation and freedom of human beings and push human society to higher living standards. However, technological revolutions are not born to be pro-poor and inclusive; they need to be "domesticated" by public policies. For instance, although the electricity revolution took place at the beginning of the twentieth century, human society has thus far failed to achieve the goal of universal access to electricity. In the past two decades, the Chinese government has integrated the goal of universal electricity access into its

8 Moore's law is the observation that the number of transistors in a dense integrated circuit doubles about every two years. The observation is named after Gordon Moore, the co-founder of Fairchild Semiconductor and CEO of Intel.

national development plans. It has also set up specific financial budgets, adopted various power generation technologies (such as hydropower, thermal power, wind power, and photovoltaic power), and used financial subsidies to encourage enterprises to participate in rural power generation in poor areas. By doing so, the massive access to electricity has been realized in recent years. The period to achieve the UN 2030 Sustainable Development Goals (SDGs) happens to span a period when digital technologies are achieving exponential growth. Understanding the essential nature of the digital revolution is a prerequisite for us to understand digital technologies and strengthen South-South cooperation in the field. As this report suggests, the digital revolution has the essential characteristics detailed below. Although those characteristics cannot fully describe the nature of the digital revolution, they are conducive to enhancing our cognition of fast-changing digital technologies and digital society, thus making appropriate decisions and taking the right actions to adapt to this revolution.

2.2.1. Moore's Law for Hardware is Transforming into a Moore's Law for Data

Fifty years ago, Gordon Moore (Moore, 1965), co-founder of Intel, predicted a doubling every year in the number of transistors per integrated circuit. Later, he revised the forecast to doubling every 18 months. This means that the performance of computers and chip-related communication technology would double every 18 months, accompanied by a substantial decrease in hardware costs. This phenomenon is referred to as Moore's law (Disco and Meulen, 1998). Over the past decades, Moore's law has been proven correct and become an indicator for guiding long-term planning and research and development programmes in the semiconductor industry. Moore's Law describes the driving force for technological and social reforms and productivity and economic growth (Keyes, 2006). Spurred by the advancement of the chip technology, the mobile Internet has witnessed rapid development, bringing human economic activities into an era of digital economy and human social activities into a digital society. In the future, humanity will embrace an era of Smart Society. However, the advancements in hardware seem to have slowed. In 2010, the International Technology Roadmap for Semiconductors predicted that the growth rate for semiconductor integration would begin decreasing in 2013. In 2015, Gordon Moore foresaw that the rate of progress would reach saturation: "I see Moore's law dying here in the next decade or so Some things will change. We won't have the rate of progress that we've had over the last few decades. I think that's inevitable with any technology; it eventually saturates out. I guess I see Moore's Law dying here in the next decade or so, but that's not surprising" (Courtland, 2015).

Despite this slowdown in the advancement of hardware integration, computing methods have witnessed a revolutionary rate in upgrading, marked specifically by the emergence of cloud computing. The technology enables computing to rely on collaborative calculation on the cloud, rather than any single computer. Meanwhile, cloud storage has begun to replace local storage. Distributed computing and storage represent revolutionary

changes in the concepts of computing and storage. As a result, computing now depends on the capacity of collaborative computing, instead of the computing capacity of a single computer. In fact, the computing capacities of a hundred million mobile phones across the world are mostly idle for long periods of every day. How to use these idle resources is a key research topic for future mobile computing. Here, our discussion focuses on ubiquitous data in the era of digital technology, instead of how to use those idle computing resources. The extensive and in-depth utilization of such data has led to the emergence of countless customized, individualized business models and social services. For instance, an online car booking platform can customize vehicles with specific brands and special routes according to customers' needs. An online education platform can customize personalized teaching services based on the high frequency of student errors. At present, with the advancement of digital technologies, total global data volume is witnessing exponential growth (Fig. 1).

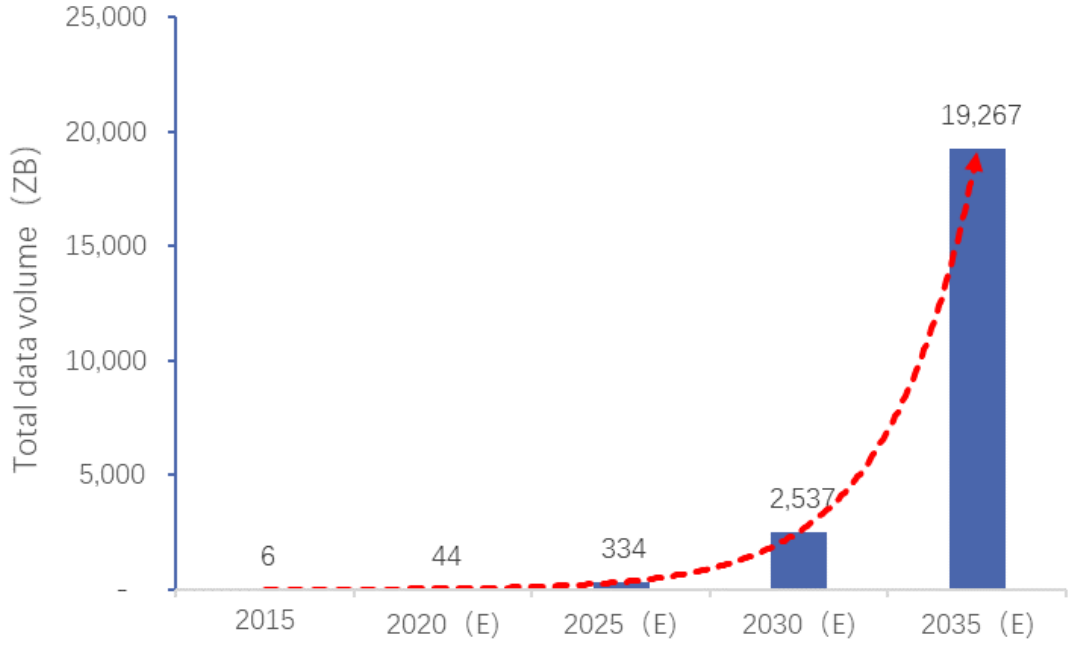

Fig. 1 The World's Total Data Volume
Source: IDC, compiled by the Chinese Institute of Electronics, quoted from Ten Major Trends of the Global Digital Economy, 2018.

Computing capacity should collaborate with effective data. Therefore, data volume and quality represent another important factor determining digital technology and the digital economy, which is equally significant in terms of hardware. As indicated in Fig. 1, total data volume is growing exponentially. This report suggests that Moore's law is shifting from the growth of hardware integration density to the growth of total data usage, namely "Moore's law for data". Just like Moore's law for hardware, which has had a huge influence on humankind's economic and social activities over the past five decades, Moore's law

for data will greatly influence economic and social activities in the decades to come. Alongside the computing revolution, human society is embracing a data revolution. The computing revolution offers fertile ground for development of the data revolution.

2.2.2. Digitalized Knowledge and Information Become New Factors for Production

Within the framework of the broad application of digital technologies, we shall divide economic activities into the traditional economy and the digital economy. The traditional economy generates wealth through integrated implementation of the three major factors of production: land, labour, and capital (Nordhaus and Samuelson, 1995). Enhancing all-factor production efficiency of land, labour, and capital through technological progress and organizational innovation has always been a core research topic in economics. labour division and resource allocation in international economic cooperation are also based on adequate flow and effective utilization of those factors. However, excessive utilization of land (natural resources) has resulted in severe environmental degradation. At present, tackling climate change and other challenges faced by global sustainable development are key elements in the UN 2030 Agenda. In the times of traditional economy, countries around the world allocate resources according to their respective resource endowments and comparative advantages. In this context, capital usually flows to countries and regions with labour dividends. However, this law is facing challenges from a world characterized by aging populations. With the development of these aging issues, the demographic dividend will gradually disappear, and the capital will flow to countries and regions with labour cost advantages. Therefore, human society must explore new growth avenues to achieve sustainable development. Developing digital knowledge and information, and, at the same time, developing the knowledge economy and the information economy will provide a new solution for economic growth.

As Fig. 1 indicates, with the rapid growth of global data volume and the increasing reliance of human economic and social activities on data, decision-making in economic, social, and political sectors will all depend on data. Thus, data becomes an important strategic resource for the development of a country or region. Correspondingly, digitalized knowledge and information become new key factors in production (CIE, 2018). Essentially, the so-called era of the information economy or knowledge economy is an era where information and knowledge serve as new factors of production and thereby become vital driving forces for economic growth and social development. By way of example Tencent was incorporated in Shenzhen, China in 1998. In 1999, it launched an instant messaging service called OICQ. The number of registered users reached 1 million. In 2001, the number of registered users increased to 50 million. In 2011, Tencent launched another new messaging service called WeChat, with more than 300 million registered users in 2013 and 1.08 billion users in 2018 (Tencent, 2019). For companies like Tencent, data is a strategic resource for rapid development and the most important factor for production. In the era of rapid growth in data, the commercial activities, business models, social activities and social forms of human society will undergo tremendous changes. With these transformations, and the

deepening of the new generation of technology, human society will embark on what can be termed smart life (Zhang, 2018). The typical indicator for smart life is interconnectivity between people is seen everywhere. The basic needs of clothing, food, housing, and transportation, as well as public services such as education, health, and old-age care, will become more intelligent. The sense of distance in physical space will, at the same time, become less important. Virtual reality, augmented reality and mixed reality will provide more options for social activities in the quest to meet people's higher spiritual needs.

As new factors of production, digitalized knowledge and information are remarkably different from the three traditional productive factors of land, labour, and capital in terms of economic characteristics. Traditional factors of production are usually exclusive. For example, if a piece of land is developed by one party, others are prevented from developing it. In contrast, digitalized knowledge and information are usually non-exclusive and feature zero marginal cost. For example, when a person uses WeChat (a social networking app), said usage does not impede others from using the app simultaneously. This particular aspect makes the sharing economy a new type of economy. Data can also "flow" at a much faster speed than land, labour or capital, and with negligible cost. The strong liquidity of data enables us to quickly allocate data resources across the world and even the universe. The core of business models in the platform economy lies in effective data flow and matching on bilateral or multilateral platforms. Emerging as a new factor in production, data, on the one hand, creates a new tool for human society to eliminate inequality, and on the other, reduces humankind's dependence on non-renewable energy and resources, while also generating sustainable production modes and lifestyles.

2.2.3. The Platform Economy Has Become a new Model for Industrial Organization

Historically, enterprises were operated within a certain boundary and scale. To pursue a scale effect, those enterprises would need to engage in merging and reorganization following the principle of integrated operation. This is due to the fact that the larger the scale of the enterprise, the lower the cost of the product per unit, and the more competitive advantage the enterprise would thus have on the market. Presently, driven by innovations in digital technologies, the boundaries of enterprises and industries are not as clear as they once were. Alongside the digitalization of economic activities, distributed storage of data brings distributed business and industrial organization models. Those innovative digital technologies such as IoT, AI, robotics and blockchain are changing traditional business models and replacing existing products and service models. In this way, they have created new market value. The integration of those emerging technologies is bringing profound changes and has exerted influence on enterprises, consumers and the environment (KPMG, 2018). The most evident feature is that platforms have become a new type of business and industrial organization model as digitalized knowledge and information turn into new factors of production. Furthermore, the platform economy has promoted integration across sectors and industries. Typically, a B2B e-commerce platform comprises approximately 10,000 individual vendors. Those vendors may be enterprises of different

sizes or they could also be composed of a large number of individuals engaged in business. Alibaba, JD.com and Airbnb are also such platforms.

Currently, many developing countries still rely on traditional production factors, namely, land, labour, and capital. On their path toward industrialization, Northern countries as well as some emerging economies have entered an era of the digital economy. At present, the platform economy is a typical form of the digital economy. The driving forces for the platform economy mainly derive from the following three aspects: digital infrastructure represented by clouds, networks and terminals (AliResearch, 2016), data, and customers who cooperate, ally and collaborate with each other—whether bilaterally or multilaterally—on the platforms. The development level of its platform economy is an indicator of a country's capacity to utilize data resources and whether it has entered the era of the new economy. The new economy differs from the traditional economy in terms of division of labour and competition, particularly due to the inherent advantages in terms of network collaboration and network effects. Network effect is the effect described in economics and business that an additional user of a good or service has on the value of that product to others. When a network effect is present, the value of a product or service increases according to the number of others using it (Shapiro and Varian, 1999). Essentially, this industrial organization pattern marks a disruptive reform of that of the traditional economy. It is obvious that many developing countries have lagged behind in the development of platform economy.

The business model in the traditional economy generally follows a linear business organization pattern with the supply chain and the value chain as the core. In this case, enterprises are inclined to adopt a strategy of integrated operation to garner profits through monopoly. The business model in the platform economy, however, follows a non-linear business organization pattern with ecosystems composed of value units as the core. In this case, enterprises are not necessarily impelled to seek a monopoly, but to adopt a pattern of cooperative operation or systematic operation. Compared to the traditional economy that seeks excessive profits or competitive leverage in which "winners take all", the platform economy places greater emphasis on win-win cooperation brought about by network effects. Accordingly, traditional linear organization and management are replaced by networked structures centred on business ecosystems under the framework of platform economy, and linear innovation shifts to non-linear innovation. Such linear innovation may shape a spiral pattern jointly driven by science, technology, and the market.

2.2.4 Virtual Reality and Online Communities Become New Social Network Space

In a modern society dominated by the traditional economy in which digital technologies have yet to gain mass usage, the main social network carriers tend to be physical spaces and venues such as families, communities, schools, factories, parks, and cinemas. With the development of digital technologies including IoT, AI, robotics and blockchain, the

corresponding technological and economic characteristics have come to influence production activities, division of industries, and industrial integration, and even every aspect of human lives, thereby facilitating the formation of a smart society. In such a smart society, interpersonal communication and social activities are more likely to take place in cyberspace, instead of in traditional physical spaces. In the case of medical services, for example, traditional forms of diagnostic treatment would require that patients travel to designated hospitals and clinics for services. Supported by telecommunications and information technology, big data and artificial intelligence technologies, telemedicine, e-health and medical services supported by artificial intelligence have broken the boundaries of traditional hospitals. Medical services have become more convenient and intelligent. Undoubtedly, this will radically change the organizational pattern of human social activities. Technologies such as virtual reality, augmented reality and mixed reality are disrupting people's experience and understanding of the world around them and changing the ways they interact with the world. Moreover, they have opened a window to another world, thereby transforming communities and promoting greater cooperation (Schwab and Davis, 2018).

Driven by the development of digital technologies, social service patterns in fields such as education, healthcare, and eldercare are undergoing profound changes. For instance, remote education, remote medical care and elderly care based on the mobile Internet are reshaping public service models. This new model usually involves services on the platforms, so its business model and industrial organization structure will both become platform-oriented. However, most developing countries, especially in sub-Saharan Africa, face the challenge of the "digital divide". This challenge is twofold. On the one hand, the challenge is about "Digital Divide 1.0", that is, whether people can get access to digital technology universally. On the other hand, the change is also about "Digital Divide 2.0", that is, whether people have the capacity to use the technology in the context of digital technology. The platform-oriented social services bolstered by digital technologies will influence many social development goals in the 2030 SDGs. The focus of our research is on what major influences the digital revolution will exert on developing countries and how we should strengthen South-South Cooperation in a Digital World.

2.3. Current Conditions of the Platform Economy

2.3.1. The Platform Economy Is Witnessing Rapid Development Worldwide

The advantage of digital technologies in connectivity facilitates the rise of the platform economy and is rapidly changing industrial organization patterns and business models. It has exerted tremendous influence on the division of labour and competition in global manufacturing and product and service retail. It is expected to have an even greater and more precipitous impact in the future. JD.com provides "limited time service" in many areas of China. If a sports-related order is submitted before 11:00 a.m., the parcel will be

delivered on the same day. If the order is submitted before 11:00 p.m., the parcel will be delivered by 3:00 p.m. the following day. With the support of platform technology and data, JD.com can accurately customize services for its customers. It provides "limited time service" through robot warehouse management and logistics optimization management with the support of big data. This reflects the advantages of the platform (JD, 2019). Platform companies represent a business model with intermediary mechanisms that connects one group (e.g., guests or tenants) with another group (e.g., hotels and landlords). When this intermediary mechanism reaches a certain scale, it may create a network effect that helps optimize resource allocation, meeting clients' demands and reducing the cost of information search. Airbnb plays the role of "middleman" for a vast network of online short-term rental properties and customers with accommodation needs. By matching the data of customer demand with the data of rental property service, it easily connects customers with their accommodation needs. This represents a much lower investment than the cost of searching for hotels via phones, as was the typical model in the past. The service can also meet the individual needs of customers.

Online retail is a representative industry of the platform economy. According to Statista, retail e-commerce sales amounted to over USD 2.3 trillion worldwide in 2017, an increase of 24.8 percent from 2016. The ratio of global online retail sales to global total retail sales increased to 10.2 percent from 8.6 percent of 2016. It is projected that global online retail sales will exceed USD 4 trillion in 2020 (Fig. 2). Chinese and U.S. platform companies now lead their counterparts across the globe. In 2018, the U.S. e-commerce market recorded revenues totalling USD 504.58 billion, a year-on-year increase of 12.9 percent. China is the world's largest e-commerce market, registering revenues of nearly USD 636.09 billion during the same time period. Britain, Japan, and Germany also figure among the world's top five e-commerce markets, and their revenues are much lower than that of China and the United States.

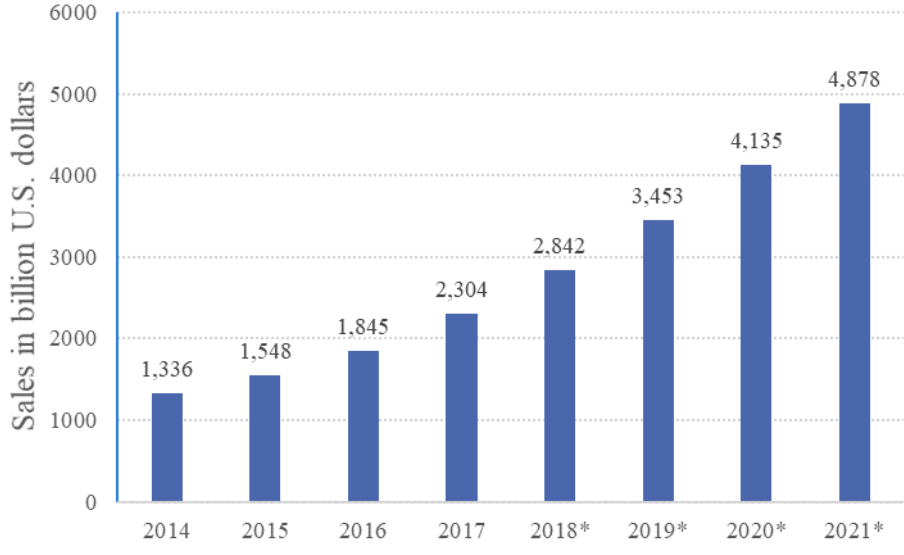

Fig. 2 Global retail e-commerce sales
Source: Statista.com

In recent years, platform companies such as Alibaba, JD.com, Tencent, Airbnb, Didi, Flipkart and have witnessed rapid growth and development. Alibaba was founded in 1999, when the company had only 18 employees. By contrast, Alibaba was nominated for the world's top 500 brands, with 86,000 employees and a market capitalization of more than USD 400 billion as of December 2018. Entrepreneurs have used digital technologies to build many global platform-based companies. Such companies are entirely different from traditional manufacturing enterprises with one end involving input and the other end involving output. Platform-oriented companies generate profits by creating network effects among customers, producers, and suppliers and by promoting interactivity following a multilateral model. Compared to traditional enterprises, digitalized platforms can achieve scale operation at a faster pace and at a lower cost. Currently, platform companies are mushrooming worldwide and witnessing rapid development particularly in emerging economies, such as China's Alibaba and JD.com and India's Flipkart (WB, 2019).

The platform economy has also seen certain developments in Sub-Saharan Africa. Jumia, the first e-commerce retail platform company in Kenya, was established in May 2013. It is now an e-commerce platform company serving 1.2 billion consumers, 1.5 million users in 16 countries, and providing more than 500,000 products and services. Jumia offers online retail services, such as phones and tablets, electronics, computers, home/office supplies, health/beauty, baby goods, fashion, automotive products, sports items, groceries, etc. (Jumia, 2019). It has opened international services in seven African countries including Nigeria, Kenya, Egypt, Morocco, Côte d'Ivoire, South Africa, and Tunisia. Each day more than 50,000 African companies transact on Jumia, which has become one of the most famous e-commerce brands in Africa. Jumia had only three employees when it started its business in 2013. Now it has grown to 1,200 employees, 60% of whom are women (Jumia, 2019). Similarly, Kilimall is an e-commerce platform targeting markets in Kenya, Nigeria, and Uganda (Kilimall, 2019). It has amassed more than 10,000 vendors and 200 million potential consumers. The platform only provides product sales service in English, with an aim to achieve unified transactions in the three countries. These platform companies have become the pioneers in the retail industry leading the modernization of the African region. Such companies may enable the African region to leapfrog the development model of hypermarkets and supermarkets, and directly enter the online retail era. The online platform may also provide many opportunities for small and medium-sized enterprises in Africa to provide retail, packaging, logistics and other services, thereby generating many employment opportunities and helping the region to escape poverty.

2.3.2. Developing Countries See Imbalanced Development in the Platform Economy

One basic prerequisite for the development of a platform economy is the popularity of mobile phones and a certain scale of netizens. First of all, it would be impossible to develop the platform economy without mobile phones. Moreover, a threshold number of mobile Internet users is another important prerequisite. Fig. 3 indicates an evident gap

in mobile phone usage between low-income countries and developed countries. Mobile cellular subscriptions per 100 people reached 62 in low-income countries, with that figure doubling in high-income countries. According to the World Bank, mobile cellular subscriptions in low-income countries only account for 62% of the total population, which means that one-third of the population is excluded from the platform economy (WB, 2018).

The mobile Internet is undergoing rapid expansion in emerging economies. Taking China, India, Brazil, Indonesia, and Russia—all of which are major emerging economies—as an example: Except for India with 87 mobile cellular subscriptions per 100 people, the rest four all have more than 100 mobile cellular subscriptions per 100 people (WB, 2018). In addition, from the global perspective, most emerging economies boast a huge Internet user population, thus offering the conditions for developing platform economies and capitalizing on size and network effects. In 2017, China's netizens totalled 772 million, with an Internet penetration rate of 55.8 percent, while the number of netizens reached 462 million, 149 million, 143 million and 110 million in India, Brazil, Indonesia and Russia, respectively. The rapid growth of Internet users is mainly due to the accelerated spread of Internet technology in the past decade. For example, in Brazil, the proportion of Internet users was only 2.9% in 2000, and it reached 60.9% in 2016 (WB, 2018).

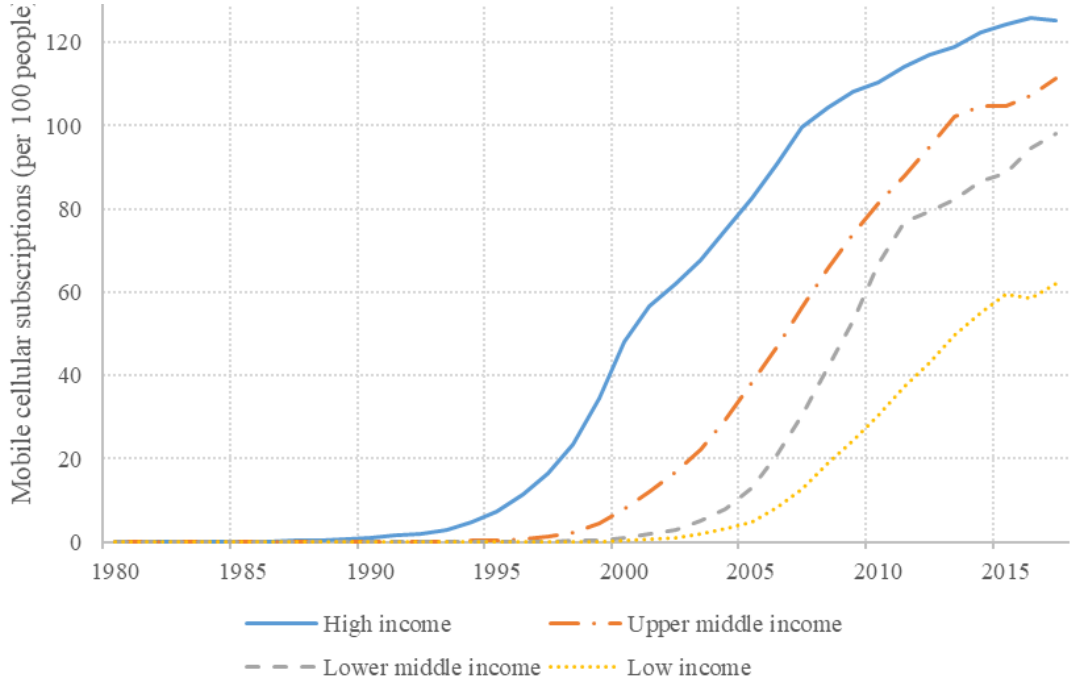

Fig. 3 Mobile cellular subscriptions per 100 people
Source: World Bank Database, Accessed in December 2018

Generally, as indicated in Fig. 3, the imbalanced development of mobile Internet worldwide also resulted in imbalanced development in the global platform economy. According to the Internet Trends 2018, among the Top 20 of the global Internet companies' market capitalization, 11 companies are American, such as Apple, Amazon, Microsoft and Google, and nine are Chinese companies, such as Alibaba, Tencent, Ant Financial and Baidu (Constine, 2018). In other developing countries, the main gap in the development of platform companies reflects the development imbalance between low-income countries and middle-income countries. Correspondingly, the development of the platform economy is also imbalanced among developing countries. The majority of developing countries are in an inferior position in this regard. We need only consider global online shopping as an example. A research report released by China International Electronic Commerce Centre (CIECC) indicates that 80 percent of the population in Denmark, Germany, and the U.K. have engaged in online shopping. More than half of the population in developed countries buy goods and services online, while the corresponding figure for Zimbabwe is only 1% (CIECC, 2017).

Among global major e-commerce platforms, Taobao, Tmall, JD.com and Flipkart all hail from developing countries. In particularly, some of China's e-commerce giants have developed into e-commerce companies with global influence. For instance, Alibaba, China's largest B2B e-commerce company, has offered services to 200 countries and regions and provided over 100 million kinds of products in 40 categories. An online marketplace targeting the global market under Alibaba, AliExpress provides services in 15 languages, secures transactions via the Alipay international account, and ships its products via international express delivery. It has become one of the world's top three English-language online shopping sites. India's leading e-commerce company Flipkart has 100 million registered users and over 80 million products (Flipkart, 2019). Although Africa also has several well-performing e-commerce platforms, Sub-Saharan African countries generally lag behind in this field. As Nigeria's largest e-commerce platform, Konga boasts more than 10,000 vendors and 50 million users. Vendors can store their products in Konga's warehouses to be delivered to buyers faster. This operation model is similar to that of Amazon (Konga, 2019).

2.3.3. The Platform Economy Is a Spark to Light Up Developing Countries

As previously noted, despite the imbalanced development of platform economies worldwide, and even among developing countries, there are some signs that the platform economy has already taken root in low-income countries. A single spark may eventually set a plain on fire. The leapfrog development of digital technologies provides those countries with the latecomer advantage. We have found that even in Sub-Saharan Africa, the platform economy has already demonstrated broader penetration in areas such as transportation, logistics, human resources, and agriculture, boasting influential e-commerce platforms as Jumia and Konga. The application of the platform economy in the area of agriculture can effectively promote the development of rural areas. Taking Alibaba's Taobao Village as an example, this initiative launched in 2013, is aimed at promoting the sale of agricultural

products and facilitating online shopping for farmers in China. In 2018, 3,202 e-commerce platforms of 'Taobao Village' were established in more than 330 counties. The number of online stores exceeds 660,000, creating more than 1.8 million employment opportunities. In 2017, Taobao Village's online store sales exceeded CNY 220 billion (approximately USD 32.3 billion) (Alibaba, 2018). Villagers can sell their own agricultural products through the e-commerce platform and also purchase seeds, fertilizers, agricultural machinery, and other daily consumer goods.

In terms of mobile ride-hailing apps, Rwanda has SafeMotos and Gawana and Kenya has Safeboda. An online ride-hailing platform targeting the wealthy, the middle-class and those at the top of the social pyramid in African cities, SafeMotos is considered one of the most innovative start-up companies in Africa. It integrates a plethora of on-demand services into a mobile app and connects those services via a physical logistics network comprising motorcycle and car drivers (Safemotos, 2019). Gawana is an app helping users find transportation services and entertainment facilities when travelling in cities of East Africa. It offers a list of available entertainment facilities as well as information such as service prices and taxi driver ratings. Users can book services directly on the app and score the driver or passenger after the trip. In the field of logistics, Ghana's Swiftly can provide online delivery service and enable users to quickly find the cheapest prices, thus enjoying convenient cargo freighting service at low costs (Jackson, 2016). The platform economy has many advantages. However, to promote the rapid development of the platform economy in developing countries, it is necessary to make great effort in policies, legislation, technological innovation, and attractive business environment. This requires technical cooperation for the platform economy as a priority area for South-South cooperation.

2.4. The Potential of South-South Cooperation in the Platform Economy

Driven by the advancement of digital technologies, the platform economy makes customized and individualized services cheaper and more convenient through the virtual marketplaces, multiple participants and the win-win cooperation it provides. Moreover, its network effects create new added value (AliResearch, 2016). It will undoubtedly become a primary business pattern in the future. The huge scale advantage and network effect also give the products on such platforms an advantage in price, since platform-based companies do not need to pay for the rental cost of the venues required by large-scale commercial establishments. The advertisements on the platform are also more effective because of their coverage, and the advertising costs are lower than those of traditional retailers. Platform companies can reduce the number of intermediate wholesalers and make the products on the platform more cost-effective. Because the platform connects more and more suppliers and consumers, (the "two-sided effect), it will have a significant Internet impact, which will also strengthen the role of the platform. The aforesaid analysis indicates that the development of the platform economy remains imbalanced worldwide

with emerging economies taking the lead among developing countries. Nonetheless, the platform economy has already sprouted in low-income countries. We have reason to believe that there is huge potential for South-South cooperation in promoting the platform economy.

2.4.1. The Platform Economy Helps Push Forward Trade Facilitation

The emergence of the platform economy has enabled entities in bilateral and multilateral markets to interconnect, thereby not only achieving economies of size but also creating new added value. Moreover, platforms have enabled customized, individualized commodities and services to emerge at nearly zero marginal cost. The platform economy changes the manufacturing model for products, and more importantly, reshapes industrial organization structures. This new business model not only influences domestic shipping and service trade, but it also becomes the mainstay of cross-border commerce. As indicated, some well-known platform companies have already emerged in developing countries, such as Alibaba, JD.com and Flipkart, all of which provide convenient e-commerce services. In the first half of 2018, China's cross-border e-commerce trading volume totalled CNY 4.5 trillion, growing by 25 percent year-on-year (RCEC, 2018). Cross-border shopping models represented by *haitao* (overseas online shopping) have gained popularity among Chinese young people born after the 1980s. The emergence of platform companies accelerated the development of cross-border e-commerce in developing countries and promoted trade facilitation. Take China's cross-border e-commerce industry as an example: In 2016, its trade volume reached 6.3 trillion yuan, and the figure is expected to grow to CNY 8.8 trillion (approximately USD 135 million) in 2018 (CECC, 2018).

South-South cooperation has an important position in cross-border e-commerce transactions in China. In the case of cross-border e-commerce between China and the Association of Southeast Asian Nations (ASEAN) countries, which began rather late (2004), by 2016, cross-border e-commerce transaction volume reached CNY 6.7 trillion (approximately USD 100 million). Compared with 2008, it has registered a nearly fourfold increase. Latex pillows and jasmine rice from Thailand, dried mangoes from the Philippines, and instant coffee from Vietnam are all very popular among Chinese consumers (CIECC, 2017). Ninety-five percent of the products sold through cross-border e-commerce between China and the ASEAN countries are also untaxed. With the support of platform promotion and tax incentives, the e-commerce platform has become a useful tool to promote trade facilitation between China and the ASEAN countries (RCEC, 2018). Cross-border e-commerce platforms such as Tmall Global, HK.JD.com and Kaola.com are likewise experiencing rapid expansion. Therefore, we should attach great importance to cooperation in digital technologies and the influence of platform companies in South-South cooperation.

2.4.2. The Emergence of Mobile Payment Platforms Facilitates Financial Inclusiveness

Capital, as one of the three major productive factors together with land and labour, is crucial to the development of any individual, family or enterprise. To enable individuals and companies to access funds is the goal of inclusive finance. However, it has long been a huge challenge for inclusive finance around the world to provide general financial services for micro and small enterprises and impoverished populations. The Grameen Bank, established by Muhammad Yunus, creatively provides "available and affordable" financial products and services for the poor. Such banks targeting the poor provide poverty relief through small loans for low-income populations in many developing countries, as part of the overall framework of South-South cooperation. Through the Grameen Foundation, the Grameen Rural Bank supports the development of microfinance institutions in African countries such as Cameroon, Egypt, Ethiopia, Morocco, Nigeria, Rwanda, Tunisia, and Uganda, and provides microfinance to farmers in these developing countries (GrameenFoundation, 2019).

However, such small loans have long been plagued by high interest rates. In fact, high interest rates are not only a mechanism adopted by all sorts of small loan institutions across the world to automatically identify and target at poor people through interest leverage, but also a requisite condition for such institutions to offset their high labour costs and maintain sustainable development. Fortunately, the emergency of mobile payment offers a solution to this persisting problem, thereby potentially marking a dawn for technological innovation benefiting the poor. Mobile payment and digital banks are expected to become useful tools for achieving financial inclusiveness in the 2030 SDGs.

Ant Financial, an online financial service company set up in 2014, announced the establishment of a strategic partnership with CD Finance (China's largest poverty-relief loan company) in June 2016 to launch the "Internet + insurance + small loans" financial service model. By combining Ant Financial's online credit assessment and management and CD Finance's offline risk control and small loan products, the inclusiveness of poverty-relief loans are effectively elevated. By the end of June 2018, Ant Financial had provided payment service, insurance and loans to 237 million, 195 million and 109 million farmers, respectively. Among its users are nearly four million rural micro and small enterprises, individual-owned businesses and farming and herbing households. In April 2018, Ant Financial signed an agreement of intent to establish a strategic partnership with the International Fund for Agricultural Development (IFAD), according to which the two parties would work together to promote digital inclusive finance in countries along the Belt and Road routes and elsewhere in the world (BFA and CAFI, 2018).

M-Pesa is a successful example for the development of mobile payment in Sub-Saharan Africa. M-Pesa is a smartphone-based fund transfer, financing and small loan service that originated in Kenya. In 2006, Kenya's per capita GDP was USD 2,156, with only one-seventh of its population having a bank account. On average, one needed to walk 200 kilometers to reach a bank outlet, thereby excluding most Kenyans from access to financial services.

M-Pesa was established in 2007 as a multilateral platform to provide cash transfer services for Kenyans based on cell phone technologies (Evans and Schmalensee, 2018). By 2018, M-Pesa's active users totalled 20.5 million, and the platform provided online fund transfer services for 28 million users. Over the past decade, M-Pesa has developed into a mobile payment platform with global influence and provided financial services for countless individuals, particularly women, students and micro and small enterprises. Through the South-South cooperation framework, M-Pesa has launched businesses in developing countries and regions such as Tanzania, Afghanistan, South Africa, India, Eastern Europe and Mozambique. Presently, based on 4G communication technology, M-Pesa has begun to shift from a traditional 2G information service to digital communications service thereby aligning with the 2030 SDGs. It is considered a role model for South-South technological cooperation that originated in an African country.

2.4.3. Digital Technologies Have Exerted a Far-Reaching Influence on Education

The SDGs defined in the 2030 Agenda are based on a consensus reached by the international community. The 17 goals involve fair provision and equal access to public services concerning education and other factors. At present, it is commonplace that many poverty-stricken areas and populations in developing countries find it difficult to access basic public services in fields such as education. The emergence of digital technologies may effectively enhance the efficiency in the provision of public services, thus increasing fairness, reducing inequality, and promoting inclusiveness. Digital technologies are exerting a profound influence on individuals, families, and communities, thereby ushering in an era of the smart society.

Based on the Internet, especially the mobile Internet, the development of online education technologies and the exploration of digital education resources offer those living in remote regions access to open, shared education services. People can use all sorts of mobile social networking platforms to build their own social circles and strengthen social communication. This report defines the new Internet-based education model as "e-education". It includes both e-education and distance education in the early stage, as well as current formats such as MOOC and live broadcasts.

Founded in 2006, eLearning Africa is primarily designed to support the "Africa 2063" initiative and to use information and communication technologies to promote knowledge sharing. Over the past 13 years, more than 17,000 participants in more than 100 countries have used eLearning Africa for knowledge sharing. The number of young people aged 15-24 in Africa exceeds 200 million, many of whom lack training and human resources. ELearning Africa has developed a variety of approaches and methods, such as conversations, demonstrations, knowledge exchange, knowledge factories, and group discussions, thereby providing better training and networking opportunities for African youth. ELearning Africa conducts annual discussions on cutting-edge topics, such the role of artificial intelligence in learning, which was conducted in 2018. So far, this has been one

of most influential cases demonstrating the impact of digital technologies on education within the framework of South-South cooperation (eLearning Africa, 2019).

The "Green Pepper" program, a social welfare campaign to support the training of young teachers in rural areas, was jointly launched by over 30 education NGOs, enterprises, universities and research institutions including Youchange China Social Entrepreneur Foundation and Beijing Normal University. The programme aims to build an "Internet+" training community platform for rural teachers to address problems such as lack of qualified teaching resources in China's poverty-stricken rural areas. It is an open platform to share quality educational resources through the collaboration of the government, the private sector and social organizations, with an eye on establishing a learning community in which everyone can study anywhere and anytime. By the end of 2017, the "Green Pepper" programme had provided online training for 22,804 teachers from 3,491 schools, governed by 63 district or county-level education bureaus in 18 Chinese provinces (Chen, 2018).

The preceding two cases highlight how digital technology is having a positive impact on education, and how South-South cooperation has great potential in this field.

2.4.4. Online Medical Care May Narrow the Healthcare Divide Between Countries in the Global South and Between Southern and Northern Countries

Online medical care refers to an Internet-based digital technology platform that provides remote medical services including diagnosis, treatment, consultation, and health consulting, as well as medical management and education. Online medical care and remote medical treatment can help overcome the barrier of geographical distance and increase the opportunity to access medical services that were unsustainable and inaccessible for remote rural communities in the past. Online medical treatment is also used to save lives of patients with critical illnesses or in emergencies (Matusit and Breen, 2009).

In July 2016, the China-Zambia Telemedicine Consultation Center was established at the Livi Mwanawasa General Hospital. The hospital was connected to the First Affiliated Hospital of Zhengzhou University in China. The two parties conducted multiple consultations and teaching through the telemedicine system, providing real-time communication between experts and patients, and among experts themselves. Ways in which the use of digital technology can strengthen the cooperation between China and African countries in the field of health care are being currently explored (Zhou, 2016). The use of Internet medical methods not only allows patients to obtain better medical services but also enhances the level of medical technology among the participating medical institutions. These new concepts and models can also be practiced in China's foreign aid medical care.

The Apollo Telemedicine Networking Foundation in India supports Apollo Hospital in carrying out remote cooperation. In order to adapt to remote consultation for medical

services in rural India, Apollo Hospital has developed a remote consultation system. Apollo TeleHealth Services also uses modern telemedicine technology to reach a broad population of people in a cost-effective and convenient way. Its goals include providing access for patients over long distances, using the most advanced technology and the best medical practitioners to deliver high-quality healthcare to patients (Ganapathy and Ravindra, 2009). The Indian government has established a Pan-African e-network based on satellite and fiber optics with a budget of more than USD 150 million. The network provides distance education, telemedicine, video conference and Voice over Internet Protocol (VOIP) services. In the Pan-African e-network, the main goal of telemedicine services is to share knowledge of Indian medical professionals with African doctors. Apollo Hospitals was the first hospital to offer a teleconsultation. In 2017, Apollo TeleHealth Services provided technical assistance to Vietnam (UNOSSC, 2017).

Telemedicine within the framework of South-South cooperation provides medical technology support to partners through a telemedicine platform based on reliable and high-speed digital technology. It also provides clinical advice and services to a wide range of people. This case demonstrates that the potential of telemedicine in South-South cooperation can be further explored.

2.4.5. Blockchain Technology May Enhance the Accuracy and Efficiency of Social Aid Efforts

Characterized by decentralization, distributed computing and tamper resistance, blockchain technology unprecedentedly combines mathematics, cryptography, computer sciences and game theory and is expanding to new application scenarios from traditional ones such as games and digital currency. The emergency of blockchain pushes the data Internet to shift toward the value Internet based on a reliable structure (Schwab and Davis, 2018). Although blockchain technology receives different degrees of restriction and criticism in various countries due to its development in the field of virtual currency, it remains a cutting-edge technology likely to influence the future of humanity. Providing cash transfer and payment services for impoverished populations has always been a major social aid measure. However, countries across the globe often face difficulties in accurately identifying and targeting the poor when attempting to provide such aid.

Since 2017, blockchain technology has been applied in poverty relief and social aid programmes in developing countries such as China and Pakistan. The high credibility of distributed accounting based on blockchain technology can prevent cash transferred and paid from "being acquired by the elites" or embezzled by non-impoverished population. In 2017, the WFP launched a pilot blockchain project called "Building Blocks" in Sindha, Pakistan. The project adopts a blockchain-based distributed ledgering method to organize data. This not only facilitates the sharing of information and the smooth execution of transactions among different people and regions, but it also reduces the chance of fraud and improper data management. Ledgers are safely recorded in an unchangeable way

thereby reducing high transaction costs arising from information imbalance, while also increasing efficiency. In 2017, 10,000 refugees used blockchain-based payments for their food in Jordan's Azray refugee camp. This was an application of the World Food Program (WFP)'s pilot "Building Blocks" project. Robert Opp, director of Innovation and Change Management Division at the WFP, believes that blockchain technology can help reduce payment costs, better protect the beneficiaries, and control financial risk (WFP, 2017).

2.5. Challenges Faced by Developing Countries in the Development of Platform Economy

Innovation has helped improve quality of life. The average life span for humans has been prolonged, basic medical care and education have become more readily accessible, and the average incomes of most people have increased exponentially. Nonetheless, the rapid development of the digital economy by the advancement of digital technologies may result in greater inequality. This new inequality may escalate if developing countries fail to make progress in infrastructure, human capital, and investment for developing digital technologies.

2.5.1. Weak Digital Infrastructure

Digital infrastructure such as clouds, networks, and terminals are foundations for launching and disseminating the digital economy and building a digital society. It is possible, however, that developing countries may achieve leapfrog development in ICT infrastructure. For example, it is unnecessary for low-income countries to follow the roadmap from analog network to 2G, 3G, 4G and 5G step by step, but directly usher in the 4G or even 5G era. Nevertheless, it is undeniable that middle-to-low-income countries lag behind in terms of digital infrastructure. The distribution of secure Internet servers and per capita GDP (Fig. 4) indicates that there is a huge gap between various countries in the number of computer servers, and least developed countries lag far behind developed nations in terms of digital infrastructure. The gap in digital infrastructure will definitely result in a digital divide and an inequality of digital dividends.

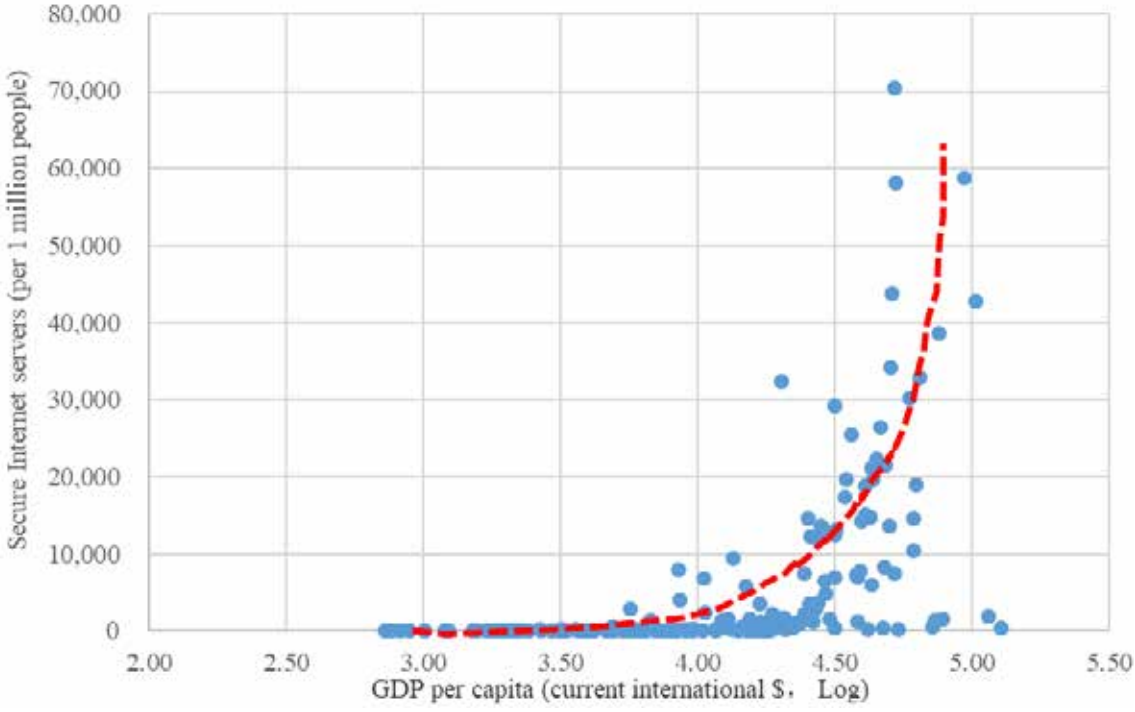

Fig. 4 Distribution of Secure Internet Servers and Per Capita GDP Worldwide
Source: World Bank, designed by the author

India's Apollo telemedicine programme is a valuable case study for South-South cooperation in Africa. However, the underdeveloped digital infrastructure in African countries constrains the service delivery capabilities of the project. In the future, this shortcoming can be effectively alleviated with the improvement of digital infrastructure.

2.5.2. Insufficient Cognitive and Social-Emotional Human Capital

The digital economy and digital society have triggered the demand for human capital. In general, human capital consists of three major components: First, physical health (including height, weight, motor skills, etc.); Second, cognitive skills; Third, social and emotional skills. Agricultural society has a great demand for the first component of human capital. That means that workers only need to have the ability to carry out heavy labour, which does not require much in terms of education. Industrial society has a high demand for the second dimension of human capital, which means that workers should be able to carry out tasks on production lines, which requires them to have certain cognitive abilities. In the era of the digital economy, robots will replace humans to do repetitive jobs on production lines, but a number of emerging service industries demand social and emotional skills and require labourers to have higher human capital. These new changes present new requirements for the sustainable development of developing countries, especially the least developed

ones. Those countries must increase investment in education and the health of human capital, which is understood as an integral facet of South-South cooperation in the era of new technology.

The World Bank (2018) has predicted that three kinds of skills will become increasingly important in the labour market, including high-level cognitive skills (such as capacity to solve complicated problems), social skills (such as teamwork skills), and combined skills of predicting and adapting capacities (such as reasoning ability and self-efficacy) (WB, 2018). Providing training in such skills means that individuals must have a solid foundation of human capital and continue learning over the course of their lifetimes. Therefore, it is particularly important to shape the foundations of human capital at the early stage of childhood. However, many developing countries have never given a priority to early development of children, and human capital achievements in elementary school education are not their priority goals. Investment in human capital requires integrated development in various aspects including preschool education, basic education, nutrition, health and social participation, all of which has been a weak link for most middle or low-income countries. Recent research on human capital indicates that the first 1,000 days of life are crucial to the formation of human capital. This means that the nutrition and health of both the pregnant mother and the child in his/her first two years are particularly important. However, this has long been a neglected aspect in child development policies of various countries, and it therefore requires greater attention within the framework of South-South medical care cooperation and the aid programmes provided for developing nations.

2.5.3. Technological Inequality Increased Due to Inadequate Technology Transfer and Independent Innovation Capacity

Technological transfer as a factor in international cooperation, as well as independent innovation, are essential for a country's technological progress. The development of digital technologies such as IoT, AI, robotics and blockchain further increases the requirement for technology transfer and innovation capacity. AI, for example, is a science, knowledge and technology-intensive industrial system involving computer vision, natural language processing, virtual assistance, advanced machine learning, automatic planning, and advanced computer games. At present, such revolutionary technological and innovation capacity exists in only a few countries. McKinsey has predicted that AI will generate USD 13 trillion of additional economic output by 2030, increasing the global GDP by 1.2 percent every year (McKinsey, 2018). A key challenge ahead is that access to AI may widen the divide between countries, enterprises and workers. Countries like the United States and China, which have taken the lead in this field, are reaping high economic returns from AI development, while emerging economies may only garner revenues half of that of leading countries, and most middle or low-income countries may be exempted from this trend altogether. The divide between individual companies will also expand, with workers also showing disparities in their mastery of digital technologies and cognitive abilities.

According to research conducted by Kai-Fu Lee, McKinsey, and others, given the explosive growth of AI, technology may create greater inequalities than occurred with the advent of steam power, electricity and the computer (Li, 2017). This consequence will negatively impact countries, enterprises, and workers alike. AI-based equipment may shift from repetitive jobs to social and cognitive jobs. As a result, over 40 percent of human jobs will be replaced by machines in the future. Moreover, this employment revolution may be completed in a relatively short period of time, instead of the century that it took in the process of industrialization. Low-income countries and most middle-income countries do not have the capacity to adapt to such technological transformations, and they also lack innovation capacity. This means that AI may usher in glaring inequalities for the world economy in the short run. Developing countries must prepare themselves for the impact of such inequalities. Thus, we need to emphasize technology transfer and promote independent innovation in South-South cooperation.

2.6. Strengthening South-South Cooperation in Platform Economy Technology

ICT has the potential to help all countries achieve SDGs. There is greater and greater evidence that the improvement in the capacity of obtaining, transferring, improving and utilizing ICT is conducive to eliminating poverty and accelerating the achievement of the UN Millennium Development Goals, such as realizing gender equality, ensuring environmental sustainability, and combating disease (UN, 2014). Digital technologies could be a double-edged sword in the process of achieving the SDGs. On the one hand, projects like M-Pesa can use digital technologies to push forward financial inclusiveness, yet digital technologies could widen development gaps and create new inequalities at the same time. Therefore, in a time of globalization and connectivity, South-South cooperation will play an increasingly significant role in balancing the influence of new technologies. The goal of the South-South cooperation policy is to enable those cutting-edge technologies to bring greater benefits to the poor and promote more inclusive and sustainable development.

2.6.1. Strengthening Transnational Transfer of Digital Infrastructure and Technologies

Digital technology infrastructure includes both hardware and software. Inadequate digital infrastructure remains a key bottleneck hindering universal access to digital technologies. The lack of digital infrastructure related to mobile communications, storage, computing and collaboration is an obstacle that least developed countries and regions must overcome in order to achieve the 2030 SDGs. It is necessary to carry out an evaluation in developing countries of current information infrastructure development, and therefore to identify key projects and areas for cooperation on information technology

infrastructure at different stages. By strengthening South-South cooperation, we can facilitate the transnational transfer of digital infrastructure, spread knowledge and narrow the digital technology divide, thus enabling the entire world to gain universal access to digital technology. This should become a fundamental principle for cooperation on digital infrastructure technology. Developing countries should work toward attracting foreign direct investment in digital infrastructure accompanied with the introduction of advanced technology. Similarly, efforts must be made to strengthen technology transfer cooperation in digital infrastructure investment and trade, while gradually increasing the level and capacity of localized digital infrastructure. In addition, we need to make use of important international cooperation opportunities to strengthen technology transfer and further enhance connectivity of digital infrastructure such as clouds, networks, and terminals within the framework of the Belt and Road Initiative.

2.6.2. Strengthening Human Capital Investment in Developing Countries

The innovation of digital technologies and the universal utilization of data technology involve human capital-intensive industries. In particular, the wide application of AI technology leads to changes in employment structure and increases the requirements for human cognitive, social, and emotional skills. To address the potential inequality arising from digital technologies, we should begin with long-term investment in human capital. Early childhood development is an issue that has long been neglected, as has the lack of adequate awareness in terms of education, nutrition and health, and accessibility to public services in underdeveloped countries and many developing countries. Broad access to digital technology and South-South cooperation in digital technology require higher human capital, especially human capital with advanced cognition. We need to fully unleash the unique advantages of digital technologies in promoting education and health inclusiveness to strengthen technological cooperation, transfer and capacity building among developing countries and accelerate long-term human capital development in those countries. In addition, it is crucial to use the technological advantage of "Internet+" education to promote lifelong learning. We need to assess human capital in countries along the Belt and Road and optimize cooperation with those countries in terms of investment, trade and human capital according to their respective conditions. Different human capital endowments may directly affect the cost-effectiveness of investment in countries along the Belt and Road.

2.6.3. Fostering Independent Innovation Capacity of Developing Countries

Independent innovation is a type of creative activity in contrast with technological importing and intimation, and it refers to a process of realizing the value of new products based on unique core technologies when a country owns independent intellectual property rights. Instead of an isolated creation process within a single country, independent innovation also involves two-way learning and cooperation. We need to promote transnational communication of independent innovation knowledge and provide policies, systems and

an environment to facilitate innovation. Particularly, we need to strengthen intellectual property protection and encourage independent innovation. M-PEPSA is essentially provided by developed countries with technical support and make innovations based on the local practices in Kenya. Ultimately it forms the current mobile financial services which is influential in the world.

We must encourage independent innovation that serves low-income communities. That means we need to innovate for the poor, low-income communities and underdeveloped regions. The innovation of India's Apollo telemedicine programme aims to meet the needs of the people in many rural poor areas in India for medical services. This innovation is based on the advanced ICT technology in India, which has been further extended to developing countries in Africa and Asia. Innovation activities need not only to cater to the consumption demand of high-income groups, but also to ensure the impoverished population's universal access to basic needs and basic services. This is key to achieving the 2030 SDGs through innovation in digital technologies. We need to draw lessons from cases involving innovation for low-income communities in various countries and promote the share of those knowledge and experience through South-South cooperation, so as to accelerate independent technological innovation and promote the inclusiveness of cutting-edge technologies. By accelerating the pace of knowledge sharing in South-South cooperation, we can promote the innovation of technology and the inclusiveness of cutting-edge technologies.

2.7. Concluding Remarks

In the field of traditional technological cooperation, developing countries have advanced many successful models for sharing knowledge and experience within the framework of South-South cooperation. By way of example, China's agricultural technology demonstration centres in Africa have successfully shared agricultural technology and knowledge from China. There are also good practices in online South-South cooperation, such as eLearning Africa, which has played an important role in training and discussions on cutting-edge technology in Africa. India's Apollo telemedicine programme has played a positive role in knowledge sharing in developing countries such as African countries and Vietnam.

In the future, South-South cooperation first needs to strengthen knowledge sharing in underlying digital infrastructure construction, and help developing countries enhance their capacity for constructing digital infrastructure such as clouds, networks and terminals, with government officials responsible for planning and policy formulation as the key targets. Second, we need to strengthen knowledge sharing in business models for the platform economy and APP development, with leading digital economy enterprises in developing countries as the focus. Third, we need to strengthen knowledge sharing concerning big data analysis and application ability, with data analysts at universities, research institutions and commercial firms as the focus.

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CHAPTER III

Digital Trade and Cross-Border E-Commerce in the Global South

3.1. Cross-Border E-Commerce Transforming International Trade

In the framework of global economic digitalization, cross-border e-commerce has emerged as an increasingly significant force in international trade. Despite the fact that international organizations have yet to reach a consensus on the definition of "cross-border e-commerce", the World Trade Organization (WTO), the World Customs Organization (WCO), the OECD and others have agreed on "platform-based transactions" and "cross-border transactions" as the basic features of cross-border e-commerce. Disagreements remain on whether it should include "cargo trade" [9] or "services directly oriented to customers". Some people conceive of cross-border e-commerce platforms as only selling physical goods, while others believe that because cross-border e-commerce platforms are not only selling physical goods, while they also sell virtual goods such as e-books. At the same time, some people think that the products sold by cross-border e-commerce platforms are directly oriented to online consumers, while others do not think so.

We believe that cross-border e-commerce is essentially digitalized trade. Such trade digitalization involves both trade in goods and trade in services. It is a business model based on digital transaction technologies, with the purpose to provide information about digitalized commodities or services for both suppliers and buyers and with digitalized information as the trade standard. Global economic digitalization has not only brought new forms of commodities and services, but also generated new services, workflows and business models. It enhances the tradability of cross-border services and expands the scope of cross-border e-commerce. The cross-border e-commerce system involves a wide array of elements including digital technologies, logistics, customs, payment, and security. It is characterized by its global, invisible, anonymous, real-time, paperless and rapidly evolving nature, and its development requires the in-depth cooperation of all countries (Dhgate.com, 2017).

The limitations of traditional trade mainly lie in the monopolization by transnational companies and high costs. By cutting transaction costs, cross-border e-commerce creates more opportunities for small and medium-sized enterprises, thus increasing the opportunity for countries in the Global South to deepen technological and investment cooperation. Southern countries can strengthen infrastructure construction and international

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9 Cargo trade is also known as tangible (commodity) trade (tangible commodity trade), and the goods used for exchange are mainly physical goods that are expressed in solid form and are tangible trade.

cooperation by introducing foreign capital. Before 2013, cross-border e-commerce mainly prevailed in developed countries. E-commerce platforms, as exemplified by Amazon,[10] having expanded across developed countries, achieving rapid development of cross-border e-commerce. Europe, for instance, has become the world's largest cross-border e-commerce market. Statistics released by PayPal showed that the number of cross-border e-commerce consumers reached 15.2 million in Germany in 2016, with total expenditures of USD 8.21 billion, with that figure increasing by four percent in 2017 (emarketer, 2019). PayPal and Ipsos estimate that the number of cross-border e-commerce consumers in the UK in 2016 was approximately 12.9 million, with a consumption of approximately USD 10.24 billion (emarketer, 2019). It is estimated that the consumption in 2017 will only increase by 0.5% (emarketer, 2019). The United States is the most favored cross-border e-commerce market worldwide (Digitalcommerce360.com, 2019). Taking the total sales of online retailers as a factor, this is the most accurate way to measure the overall marketing of e-commerce to retail. From this perspective, total retail sales have reached USD 3.396 trillion, an increase of 3.8%. This means that e-commerce accounted for 13.0% of total retail sales in 2017, significantly higher than 11.6% in 2016 (Digitalcommerce360.com, 2019).

In 2017, U.S. consumers spent USD 453.46 billion on online retail purchases, an increase of 16.0% from 2016 (USD 39.99 billion), the highest quarter since 2011. (Statista, 2019). Data from the U.S. Department of Commerce showed that the fourth quarter of 2017 witnessed the fastest growth of the country's e-commerce market in the past six years. A CyberSourcer[11] survey indicated that over half of American online vendors received orders from abroad (CyberSource, 2019). China's cross-border e-commerce platform is represented by DX, Lanting Gathering and AliExpress[12]. The development of cross-border e-commerce has led to changes in the main body of international trade and trade patterns. A large number of Chinese SMEs have begun to participate deeply. The e-commerce penetration rate in Canada has reached 70 percent and that of its cross-border e-commerce surpassed 50 percent, both much higher than the world average. According to Internet world stats,

10 Amazon, headquartered in Seattle, Washington, is the largest e-commerce company in the United States.

11 Cyber Source was born in 1994 at the dawn of e-commerce and is now one of the pioneers of online payment and fraud management services for medium and large businesses. In 2010, Cyber Source was acquired by Visa and operated as a wholly owned subsidiary of Visa.

12 AliExpress was officially launched in April 2010. It is the only online trading platform created by Alibaba for the global market. It is called "International Edition Taobao" by the majority of sellers. AliExpress is open to overseas buyers, through Alipay International accounts for secured transactions, and using international express delivery. It is the third largest online online shopping site in the world.

the average penetration rate of e-commerce in the world in 2000 was 4.73% (Internet World Stats, 2018).

Developing countries in the South are latecomers in the development of cross-border e-commerce, thus having a comparatively low penetration rate and a smaller size. Nevertheless, cross-border e-commerce has brought new development opportunities for Southern countries. A number of platform companies with unique characteristics have taken root in those countries, of which the most noticeable are shown in the table below (Table 3.1). Those platforms have significantly promoted the development of cross-border e-commerce in Southern countries. Generally, many countries in the South still suffer rudimentary digital infrastructure, embryonic online consumption habits, underdeveloped logistics facilities, unitary platforms and insufficient human capital for cross-border e-commerce, and thus fail to fully integrate into the global cross-border e-commerce network.

Table 3.1 Southern countries – Cross-Border E-Commerce Platforms (partial)

Company	Summary Description
Alibaba	Alibaba Group, established in 1999, was listed on the New York Stock Exchange on September 19, 2014. Its founder and chairman is Jack Ma. The group was ranked 300th on the Global 500 list released by the *Fortune* magazine on July 19, 2018.
JD.com	JD.com is China's biggest self-operated e-commerce company. On May 22, 2014, it was listed on NASDAQ. On June 18, 2018, the company and Google jointly announced that Google would invest USD 550 million in JD.com.
Flipkart	Flipkart is India's largest B2C e-commerce platform. In July 2018, Walmart acquired the company at a price of USD 16 billion, the biggest acquisition ever made in Walmart's history.
Jumia	Even the Sub-Saharan African region is witnessing the emergence of fast-growing cross-border e-commerce platforms like Jumia. Established in 2012, Jumia has become Africa's largest cross-border e-commerce platform covering 23 African countries.
MercadoLibre	MercadoLibre, registered in Argentina in 1999, is the most popular e-commerce site in Latin America. By 2016, its users in Latin America had amassed to 174.2 million, with its services covering all Latin American countries. The same year, MercadoLibre relocated its headquarters to São Paulo, Brazil.

Jollychic	Jollychic went online in 2013. It is operated by Jollycorp, a Chinese enterprise in Zhejiang Province. So far, it has become the mobile shopping app with the biggest user base in the Middle East. By June 2018, Jollychic had more than 3,500 employees worldwide, including a customer service and operation team with 1,000 members in the Middle East.
Lazada	Established in 2012, is the most influential online shopping platform in Southeast Asia. In its early days, the platform received investments from Germany's Rocket Internet. It is now controlled by China's Alibaba Group.
Tokopedia	Established in 2009, it is the most-visited e-commerce platform in Indonesia.
Kilimall	Established in July 2014, it is Kenya's largest online shopping site. Apart from Kenya, its business has now expanded to Uganda and Nigeria.
Shopee	Established in 2015, it is an e-commerce platform targeting at users in Southeast Asia and Taiwan province of China. In 2017, its GMV reached USD 4.1 billion, increasing by 258 percent over the previous year. It is one of the fastest-growing e-commerce platforms in the region.
Konga	Konga is one of the largest online shopping sites in Nigeria.
Mall for Africa	Mall of Africa (MFA) is Africa's largest shopping mall and e-commerce platform. On May 18, 2017, it joined forces with eBay to establish the shopping site Ebayforafrica.com to provide online shopping service for Nigerian and Kenyan consumers.
Takealot	Takealot is the largest local e-commerce platform in South Africa. Its predecessor, Take2, was a South African online retailer traced back to 2011. In 2016, Takealot received the Overall Winner Award and People's Choice Award at the PriceCheck Tech & E-commerce Awards. Naspers invested 960 million rand (approximately USD 69.4 million) in Takealot.
Zalora	Headquartered in Singapore, ZALORA is an online fashion shopping platform.
Bidorbuy	Bidorbuy is another C2C platform in South Africa. Established in 1999, it is now one of the country's largest e-commerce companies. Bidorbuy has yet to secure a large piece in the cross-border e-commerce market pie. Considering the research topic of this essay, have not conducted any in-depth analysis on Bidorbuy.

Source: Designed by the authors, October 30, 2018.

As an emerging cooperation model between Southern countries, cross-border e-commerce is facing challenges such as different Internet penetration rates, knowledge

gaps, limitation on cross-border data flow, inefficient customs regulations, disparities in taxation systems and technological standards, inadequate logistics facilities, and disunity in general cross-border e-commerce regulations. These challenges will be detailed in the third section below. To address these problems, Southern nations need to enhance their planning, standards and capacity building for cross-border e-commerce, so as to make cross-border e-commerce play a greater role in SSC.

This chapter is divided into four parts to analyze the status quo, advantages, bottlenecks and recommendations of cross-border e-commerce development in the South. First, it analyzes the development status and cooperation model of cross-border e-commerce cooperation in Southern countries and analyzes it from two perspectives: development speed and scale and cooperation mode. Second, it introduces the limitations of traditional trade and the advantages of cross-border e-commerce relative to traditional trade. Afterwards, the development bottleneck of cross-border e-commerce in SSC was pointed out. Finally, it advocates the promotion of rules, standards and capacity building for cross-border e-commerce cooperation in South-South cooperation and discusses them separately. The content mentioned in this paragraph will be described in detail below.

3.2. The Development of South-South Cooperation in Cross-Border E-commerce

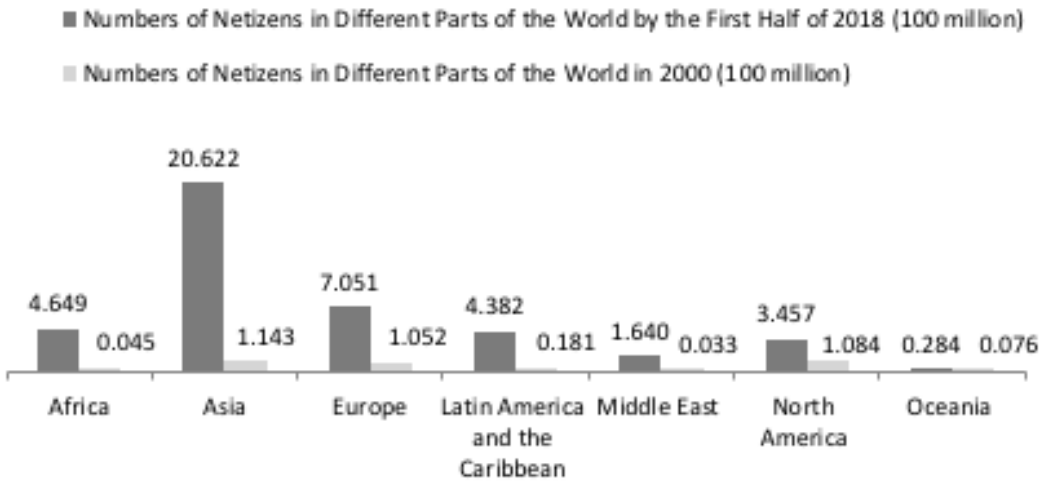
Deeper cooperation in the field of cross-border e-commerce can inspire Southern nations to become more involved in trade cooperation, complement their resource advantages, accelerate economic development of all parties, and enhance their economic strength together. From the statistics on Internet usage, the number of Internet users in the Southern countries has increased considerably from 2000 to 2018, but the total number is still small. At the same time, the penetration rate of e-commerce users in the Southern countries is low, indicating that a large number of potential users has not yet been developed. The Southern countries grew rapidly from 2000 to 2018. The fastest growth reported is, in fact, in Africa, the Middle East, and Latin America, where the number of Internet users in 2018 was more than 200 times that of 2000. In addition, this huge market potential has attracted developed countries and local enterprises in the South to cooperate and learn to develop cross-border e-commerce business. Through the cooperation of funds, platform technology, and standards and rules, the scale of cross-border e-commerce has experienced rapid expansion in the South.

3.2.1. Rapid Development of Cross-Border E-Commerce in Southern Countries

Countries in the Global South are taking an active part in the wave of cross-border e-commerce cooperation, evidenced by the continuous expansion in the scope of such cooperation, the constant increase in cross-border e-commerce consumers and coverage, and the fast growth of local cross-border e-commerce platforms.

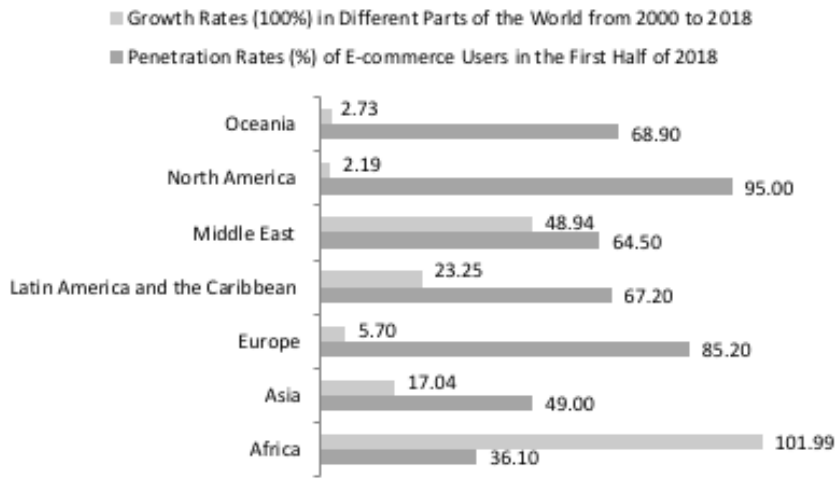
In terms of consumers, Southern countries have become the main contributors to global netizen growth (Fig 3.1), and the number of cross-border e-commerce consumers continues to expand. Statistics indicate that the world's Internet users surpassed 4.2 billion by June 30, 2018, when the global population was approximately 7.635 billion (Internet World Stats, 2018). Asia has the world's most Internet users, totaling 2.062 billion in 2018, with an Internet penetration rate of 49 percent (Internet World Stats, 2018). From 2000 to 2018, the continent's Internet users grew by 1704 percent. The netizen population in Africa is smaller, with a total of 465 million in 2018, and an Internet penetration rate of 36.1 percent (Internet World Stats, 2018). However, Africa did witness a 10199-percent increase in Internet users from 2000 to 2018 (Fig 3.1).

Fig 3.1 Number of Internet users in various regions of the world in 2000 and the first half of 2018 (100 million people)



Source : https://www.Internetworldstats.com/stats.htm
(Excluding data of netizen population in South America in 2000 and the first half of 2018)

Fig 3.2 Penetration Rates (%) of E-commerce Users in the First Half of 2018 and Growth Rates (100%) of E-commerce Users from 2000 to 2018 in Different Parts of the World



Source: https://www.Internetworldstats.com/stats.htm
(Excluding data of the penetration rate of e-commerce users in the first half of 2018 and the growth rate of e-commerce users from 2000 to 2018 in South America)

Africa and South Asia have recently experienced the fastest growth in the population of Internet users. In 2017, the number of Internet users in Africa grew by 20 percent year-on-year. Mali in Western Africa even saw a six-fold increase. In addition, the Internet users of Benin, Sierra Leone, Nepal and Mozambique all doubled in the past year. So far, about 40 million Africans have used mobile wallets, even more than those who own a bank account (Medium.com, 2019). In the South Asian country of India, the number of Internet users is growing by five million each month. This lays a sound foundation for the growth of cross-border e-commerce users in Southern countries.

In the first half of 2018, the regions with the highest e-commerce penetration rates were Oceania, Europe and Latin America & the Caribbean, at 72.2 percent, 68.75 percent and 67.2 percent, respectively (Internetworldstats.com, 2018). In terms of the growth rate of e-commerce users from 2000 to 2018, the top three regions were Africa, the Middle East, and Latin America and the Caribbean, increasing by 101.99 percent, 48.94 percent and 23.25 percent, respectively (Internetworldstats.com, 2018) (Fig 3.2). Such elevated growth indicates that cross-border e-commerce in the South has been and is still in the early stages of development, and that the cross-border e-commerce industry in the South is still in the stage of increasing returns to scale. In view of the fact that there are still a large number of markets in the South, the cross-border e-commerce in the Southern countries is expected to continue to develop rapidly.

In most countries in the Global South, e-commerce is on the verge of exponential growth. A report released by Morgan Stanley has projected that India's e-commerce market will reach USD 200 billion by 2026 (https://www.ibef.org, 2019). Such African countries as South Africa and Nigeria are also witnessing rapid growth in cross-border e-commerce users. Statistics indicate that cross-border e-commerce has penetrated into all Southern countries, however the penetration rate remains low in general and is imbalanced across different

countries. South Africa tops African countries in terms of Internet and mobile phone usage and dissemination rates. However, since South Africa has the second largest and the most advanced economy on the African continent, the scale and complexity of the economy cannot be ignored. Nonetheless, its total e-commerce penetration rate remains only one percent. With a similar Internet usage rate as South Africa, however, China's e-commerce penetration rate has already exceeded 17 percent (www.digitalcommerce360.com, 2019).

In developed countries, cross-border e-commerce is dominated by large platforms sprouting in only a few developed economies such as eBay[13] and Amazon. By contrast, local platforms or transnational platforms deriving from developing economies occupy an important position in cross-border e-commerce of Southern countries.

In 2014, eBay Group released the "2014 China Cross-border E-Commerce Retail Export Industry Development Trend Report". According to this document, the fastest-growing market for cross-border e-commerce retail exports was Greater China (2013), which was defined as an emerging market for cross-border e-commerce. These emerging markets include Germany, Canada, France, Russia, Brazil, Israel, Argentina, as well as various other countries. The fastest growing of these is Argentina, with a growth rate of 130%, followed by Israel with a growth rate of 78%. E-commerce consumption potential is positioned to expand exponentially, with Internet penetration and e-commerce penetration rates in the Middle East now leading the way. Similarly, e-commerce development opportunities are in an explosive period. This region has a population of 600 million, 340 million netizens, 60% of the population is younger than 35 years old, and the demographic dividend is quite considerable (Youthpolicy.org, 2019).

According to research by Google and the investment company Temasek Holdings, Southeast Asian e-commerce sales will increase from USD 21.8 billion in 2016 to USD 88 billion in 2025, with the proportion of total retail sales increasing to 6%, yet still with tremendous potential for expansion (Google & Temasek, 2018). It is estimated that the number of Internet users in Southeast Asia will reach 600 million in 2025, with a network coverage of 80% (Google & Temasek, 2018). In Africa, local e-commerce platforms including Jumia, Konga, Mall for Africa, Takealot and Bidorbuy, boast market shares much higher than that of Amazon. E-commerce stand-outs in the Southeast Asian market include Lazada, Shopee, Zalora and Tokopedia, just to name a few. Due to its weak competitiveness, those cross-border e-commerce platforms such as Japan's Rakuten[14] were once forced to retreat from the market. The Latin American market is dominated by local platforms such

13 Established on September 4, 1995, eBay is an online auction and shopping site open to global users.

14 Rakuten, established in February 1997, is one of Japan's largest online shopping platforms. It focuses on provide services for consumers and enterprises.

as MercadoLibre, Netshoes[15], Lojas Americanas[16] and OLX[17], as well as China's AliExpress.

Platforms from developed countries such as eBay and Amazon only secure a small tranche of the market pie. This is due to the fact that many have yet to fully accept cross-border e-commerce, there is still an entrenched commercial culture, and the overall sense of conservatism is strong. Many also do not yet understand such existing platforms as Amazon or eBay, and they may be afraid of taking risks. Likewise, local platforms such as Flipkart and Snapdeal[18] have snatched the majority of India's cross-border e-commerce market. In India's Flipkart, the Snapdeal platform has the largest market share among India's total cross-border e-commerce platforms. Meanwhile, China's cross-border e-commerce platform Club Factory[19] is also expanding rapidly in the Indian market. In China, local platforms such as Alibaba (including Taobao and Tmall) and JD.com occupy three-fourths of the domestic market. Jollychic has been one of the leading mobile E-commerce platforms in the Middle East and North Africa (MENA) area (Jollychick, 2019).

Large-scale integrated platforms gradually spread to the global market and have become the focus for more expanded markets. A cross-border e-commerce platform under Alibaba Group, AliExpress has become one of the most active cross-border online platforms in the world. Official data indicate that the AliExpress app's installations have surpassed 600 million overseas in 2018, ranking among the top 10 apps around the world (Aliexpress, 2019). Overseas individual buyers using AliExpress have now reached 150 million, covering 230 countries and regions and 22 regular consumption categories, with Russia, the United States, Spain, Brazil, and France as the key transaction markets (Aliexpress, 2019). Moreover, specialized cross-border e-commerce platforms that target particular consumption niches are also on the rise in Southern countries. For example, Zalora, a Business to Business (B2B) e-commerce platform focusing on apparel and shoes, has become one of the fastest-growing e-commerce platforms in Southeast Asia. Its services cover Indonesia, Malaysia, Brunei, the Philippines, Thailand, Vietnam, Australia, and New Zealand, as well as Hong Kong and Taiwan province of China (Zalora, 2019).

Alongside the rapid development of cross-border e-commerce, the continuous expansion

15 Netshoes, established in 2000, is one of Brazil's largest online sports product retailing platforms.

16 Lojas Americanas, established in 1929, is the shopping site of a Brazilian retail chain.

17 Founded in 2006, OLX is part of the OLX Group, a trading platform network that operates in more than 40 countries under 17 brands.

18 Snapdeal is one of India's largest online shopping platforms, and mobile device sales account for the majority of its online transactions. In recent years, however, Snapdeal's market share has been shrinking rapidly.

19 Club Factory is a China-based big data platform providing commodities selection services, with its suppliers being small and medium-sized manufacturers and wholesalers. In February 2018, it received an investment of 100 million U.S. dollars in the Series C Round financing.

of digital trade and the increasing maturity of services throughout the industrial chain, digital trade—as an open, shared, transparent and inclusive trading mode—has enabled more and more small and medium-sized enterprises and online vendors to integrate into the global value chain via digital platforms and enjoy the convenience and business opportunities brought by globalization. Due to its unique characteristics, cross-border e-commerce offers Southern countries a chance to achieve market insertion, so that local platforms or platforms based in Southern countries will be able to compete with their peers from developed countries.

3.2.2. Active Cross-Border E-Commerce Cooperation between Southern Countries

With the expansion and evolution of cross-border e-commerce in Southern countries, the related cooperation models are also becoming increasingly diversified, giving rise to cooperation based on capital, platform technology, and standards and rules

Capital Cooperation

All of the local cross-border e-commerce platforms in Southern countries are backed by international capital. On the one hand, mergers and acquisitions among cross-border e-commerce platforms have become frequent in Southern countries, whereby cross-border trading platforms in those countries have achieved faster expansion and been able to enhance their competitiveness. Furthermore, many platforms and investors from developed countries are swarming into the cross-border e-commerce markets of Southern countries by increasing investments or acquiring controlling stakes. These platforms capture the huge potential of emerging markets in the South and the low initial threshold of development. By investing in or acquiring local enterprises, they will expand their market share and lay the foundations for a global strategic market.

Chinese e-commerce companies are very active in investing or acquiring cross-border e-commerce platforms in developing countries. After it invested in India's e-commerce company Snapdeal, Alibaba Group purchased a large stake in TicketNew[20], India's second largest online ticket-selling platform, in June 2017. Then, in February 2018, it invested USD 150 million in Zomato (New India Express, 2018)[21], an online food search and delivery company in India. In 2016, Alibaba acquired a stake in Lazada, then the largest e-commerce company in Southeast Asia. In August 2017, it invested

20 TicketNew is an online ticket selling platform located in Chennai, India. In June 2017, Ali Pictures invested nearly 1.2 billion rupees to purchase the majority of TicketNew's stakes.

21 Zomato is an India-based online food recommendation platform, hence its nickname the "Indian version of Dianping.com". On February 28, 2018, Alibaba Group invested USD 150 million in the company, whose market value then increased to more than USD 1 billion.

USD 1.1 billion in Tokopedia (Reuters, 2018)[22]. China's Tencent invested in SEA, the parent company of Southeast Asia's social networking and shopping platform Shopee. Moreover, Chinese cross-border e-commerce companies have operated a number of online shipping platforms overseas. For example, Jollychic, the most active mobile online shopping app in the Middle East, is operated by Jollycorp, a Chinese enterprise in Zhejiang Province. Africa's Kilimall is also backed by investments from China. In South America, MercadoLibre [23]acquired Portal Inmobiliario[24], a classifieds website in Chile in 2014, and then the Silicon Valley-based e-commerce company Dabee[25] and Metroscúbicos.com[26], a portal site under Mexican real estate company GrupoExpansión, in 2015.

After it acquired Argentina's payment company Mango Pay[27] in 2016, MercadoLibre further expanded the coverage of its payment business. Classified information website OLX is another example of transnational investment and cooperation of e-commerce platforms. Established in 2006, OLX[28] now has 1,200 employees, with its business reaching more than 40 countries. It is backed by U.S. venture capital groups such as Bessemer Ventures and General Catalyst Partners. It entered the Indian market in 2009. In 2016, the OLX Group was founded. The following year, it purchased Auto Trader[29] in South Africa and then invested in Frontier Car Group[30] in 2018 to maintain its expansion in the fast-growing second-hand car market. It also acquired Properati, a high-end real estate transaction platform in Argentina (www.olx, 2018) . In Africa, Takealot purchased Mr Delivery in 2014 and reorganized it into the logistics company Takealot Delivery Team and the food delivery company Mr D Food. It also merged with Kalahari, a 17-year-old e-commerce platform, for an in-depth integration of its e-commerce resources. In June 2018, Takealot's online fashion brand Superbalist and Media24's Spree merged to expand online fashion services.

Southern e-commerce companies have three reasons to invest in or acquire e-commerce platforms in developing countries. The first is the great potential and malleability offered

22 Tokopedia, established in 2009, is Indonesia's largest e-commerce platform and most-visited website.

23 MercadoLibre is the largest e-commerce platform in Latin America. Its online shopping services have covered 19 countries in the region, including Brazil, Argentina, Mexico, Chile and Colombia. It now ranks as the world's seventh website in terms of page views.

24 Portal Inmobiliario is a classifieds portal site in Chile.

25 Dabee, established in January 2010, is backed by investments from Monashees Capital, Napkn Ventures and 500 Startups.

26 Metroscúbicos is the online platform of a Mexican real estate company.

27 Mango Pay, established in 2012, is a European online payment platform.

28 OLX, established in 2006, is the largest shopping website in India, Poland and Brazil.

29 Auto Trader is a second-hand car retailer in South Africa.

30 Frontier Car Group is a tech startup based in Berlin, Germany that provides a second-hand car transaction platform for emerging markets.

by developing countries as emerging markets for cross-border e-commerce. Furthermore, due to the lack of initial competition, training is relatively straightforward and user loyalty is relatively easy to secure. Second, developing countries are part of the world market and are thus part of the global strategic deployment of some large-scale cross-border e-commerce platforms. Investment or acquisition is also a good way to build a brand and improve supply chain integration and overseas marketing capabilities. Third, the current cross-border e-commerce in emerging markets is growing rapidly. With the help of funds, cross-border e-commerce in the South has become a global focus, attracting many e-commerce companies.

At present, common mergers and acquisitions also involve vertical mergers and acquisitions of manufacturers. Most cross-border e-commerce companies do not produce products themselves but have strong supply chain integration and e-commerce operation capabilities. Many traditional domestic manufacturing enterprises have production capacity and may wish to sell products abroad but suffer from a lack of sales channels, or a bottleneck of traditional product development needs to expand the product line to related industries. In such cases, the acquisition of cross-border e-commerce can help achieve the desired goals. On the one hand, the existing sales network of cross-border e-commerce can be leveraged to quickly sell products to the world, achieve online and offline integration, and also use existing supplier networks to expand product lines. There is also a trend toward horizontal mergers and acquisitions of traditional foreign trade enterprises. That is, traditional import and export trade enterprises expand their online retail business by acquiring cross-border e-commerce, realizing 2B + 2C, and online and offline development. Customers interface with the terminal from the B2B thereby sidestepping the middlemen or department stores. The B2C transformation of consumers is characterized by labour-intensive products such as textiles and clothing, and the transformation of bulk commodities into fast-moving consumer goods and light luxury goods. The trade model is being transformed from B2B commerce to online and offline O2O models. Finally, we are also seeing diversified strategic mergers or cross-border transformations.

From another standpoint, a large amount of international capital is flowing into cross-border e-commerce platforms in Southern countries. In 2013, Africa's Jumia received an investment of USD 26 million from Summit Partners[31]. In 2016, after its reorganization, Jumia got an investment of USD 469 million from Goldman Sachs, with its estimated market value surpassing USD 1 billion, thus becoming Africa's first unicorn company (Jumia.com.ng, 2019). In May 2014, South Africa's Takealot obtained an investment of USD 100 million from Tiger Global Management, LLC. Confident of the promising future of Takealot, in August 2015, Naspers invested an additional ZAR 716 million to increase its

31 Summit Partners is a growth equity investment company dedicated to investing in fast-growing startups.

stake in Takealot to 42 percent. Moreover, Naspers acquired OLX, a classifieds website in South America. In 2011, MercadoLibre and eBay signed a five-year cooperation agreement, according to which eBay became one of MercadoLibre's two controlling shareholders. A controversial German start-up incubator, Rocket Internet, has invested in many cross-border e-commerce platforms worldwide, including South America's Dafiti[32] and Linio[33] and Southeast Asia's Zalora. In July 2018, Walmart spent USD 16 billion acquiring India's e-commerce giant Flipkart. In July 2015, the French luxury brand LVMH purchased Luxola[34], a B2C cosmetics shopping site in Southeast Asia.

32 Dafiti is an online fashion retailer in Brazil.

33 Linio, established 2012, has seen its transaction volume increasing by more than 150 percent for three consecutive years. A large e-commerce platform in Latin America, it has 27,000 vendors selling 60 categories of products, with SUK surpassing six million.

34 Luxola, established in 2011, is an e-commerce platform specializing in skincare products and cosmetics. It now offers about 4,000 products from 250 brands and serves consumers in 11 markets, including Australia, Brunei, Hong Kong, Indonesia, New Zealand, the Philippines and the United Arab Emirates, as well as its home base Singapore. Moreover, Luxola is the sole online retailer for 65 cosmetics brands in the Southeast Asian market. The website's monthly individual visitors amass to about 540,000, and its monthly page views 1.08 million.

Platform Technology Cooperation

Based on the unique features of Southern countries, cross-border e-commerce platforms in those countries have forged some cooperation models worthy of further dissemination. In the process of promoting cross-border e-commerce cooperation, Southern countries have expanded technological cooperation through investments and acquisitions, in keeping with their respective development models.

Among the countries in the Global South, those with a comparatively developed cross-border e-commerce industry have the capacity to export relevant technologies to other Southern countries. Chinese e-commerce platform technological cooperation with its peers in other Southern countries is particularly conspicuous. Since 2015, Chinese e-commerce giant Alibaba has continuously invested in Indian e-commerce and mobile payment platform Paytm. In the process, Alibaba has also brought the technologies and operational models that it has developed in China to Paytm[35]. In the payment service niche, Ant Financial Services respects the user's localization options. By acquiring shares and then exporting the technological capabilities amassed in the Chinese market, the market can be captured as quickly as possible. Due to technological support from Alibaba, Paytm's user base has increased rapidly. According to the *Wall Street Journal*, Paytm's mobile users reached 225 million in 2017, four times more that the combined figure of India's local mobile payment service providers MobiKwik[36] and FreeCharge[37]. In December 2017, Alibaba joined forces with Paytm to purchase a 20-percent stake in Bigbasket[38] at a price of USD 200 million. Alibaba also invested USD 175 million in Paytm Mall, a shopping site under Paytm, thereby injecting a considerable stimulus into Paytm's e-commerce business (Baidu, 2018).

In January 2018, Alibaba invested USD 100 million in India's logistics company XpressBees[39] to reorganize logistics services of Paytm Mall and Bigbasket, laying the groundwork for the establishment of its Indian logistics network. In January 2018, Didi[40] announced that it would acquire Brazil's largest ride-sharing platform, 99TAXI[41]. In addition to spending USD 600 million purchasing shares from its former investors, Didi invested another USD 300 million to help 99TAXI expand globally. After the acquisition, Didi sent a technological

35 Paytm is India's largest mobile payment and e-commerce platform.

36 MobiKwik is India's second largest mobile payment company, second only to Paytm. The company now focuses on providing payment service.

37 FreeCharge was formerly a mobile payment giant in India.

38 Bigbasket is India's largest online supermarket. In February 2018, it received an investment of USD 300 million from a consortium financing led by Alibaba Group.

39 Xpressbees, established in 2015, is an e-commerce logistics company. Before investing in the company, Alibaba Group had invested in India's most popular digital payment platform Paytm and online retailer Bigbasket.

40 Didi Chuxing is a renowned ride-hailing platform in China.

41 99TAXI is a Brazilian mobile cab-hailing app.

support team to help 99TAXI enhance its technological calibre. In 2014, when it invested in Peixe Urbano[42], Baidu helped the Brazilian company increase its market shares by a large margin through continuous innovation in business models. In terms of local services, Baidu is fully authorized to work in tandem with the local management team. Similarly, China's sales and order management and business expansion teams have been exported to the Brazilian market for learning and reference. China's JD.com has also exported its logistics technology abroad.

In September 2018, it launched a smart warehousing and logistics centre in Thailand, which involves a full set of supply chain service systems integrating storage, sorting, transportation, and delivery based on the overseas version of WMS5.0, which is more suitable for Thailand's warehousing and logistics conditions. The exporting of technical resources of such relatively developed enterprises to the South has had a positive effect on technological progress and e-commerce development in these regions. At present, Jingdong Logistics has built three large nets, including small-piece, small and medium-sized piece, and cross-border logistics, in Bangkok. In Bangkok, Jingdong Logistics launched its 211 limited-time service, and local consumers can now enjoy next-morning deliveries. From Beijing to Bangkok, JD Logistics has achieved a replication of advanced logistics infrastructure and quality services across a 3,300-kilometer stretch of culture and economic development. On the morning of January 22, 2019, Jingdong Group announced at the annual meeting of the World Economic Forum that a Jingdong Logistics drone had successfully completed its first flight in Indonesia. According to the website of the Internet Economic Society (100EC.CN), the first flight of the drone was based on the tripartite cooperation between the Fourth Industrial Revolution Center of the World Economic Forum, the Indonesian government, and the Jingdong Group, which fully verified the product-readiness of the Jingdong logistics drone. The end-distribution technology provides a new solution to solve the problem of logistics distribution in this nation of thousands of islands.

E-commerce platforms in other Southern countries that have a degree of technology exporting capacity are also engaged in technological cooperation. By establishing self-operated logistics and utilizing third-party delivery networks, Kilimall, for example, provides quick delivery and payment on arrival. It also cooperates with local mobile network operators to achieve a closed trading loop based on mobile payment and expand its customer base through diversified localization. Through cooperation with local mobile network operators, Kilimall has opened efficient payment channels. The use of smartphones, credit cards, and savings cards in Africa is still at a low level, yet mobile payments and mobile phone transfers are surprisingly developed. Africans have devised payment solutions with local characteristics. Money can exist directly in the mobile phone number, and the mobile operator assumes the same functions of certain banks. As a result,

42 Peixe Urbano is Brazil's largest group buying site.

Kilimall has completed the payment process by cooperating with the largest local mobile phone payer in Kenya, collecting money through their channels, and then transferring the money to the merchant on its platform.

Even in Africa, where smartphones, credit cards and debit cards are less popular, local e-commerce platforms creatively use cellphone numbers as the way to pay, enabling mobile network operators to carry out banking functions. This trend has significantly accelerated with the rapid development of mobile payment in Africa. This business model is also worth expanding to other Southern countries. In addition, indigenous e-commerce innovation is easier to disseminate in Southern countries. For example, Africa's e-commerce platform Konga merged with Yudala[43] to promote the development of an online-offline integrated business model, thereby sidestepping obstacles for further expansion.

Cooperation in Standards and Regulations

Given the contrasting policies, laws, and customs requirements in a number of Southern countries, cooperation in standards and regulations would be a prerequisite for smooth operation of cross-border e-commerce platforms.

Due to the complexity of cross-border e-commerce, Southern countries have strengthened cooperation in relevant standards and regulations. From a global standpoint, the WCO[44] established an e-commerce working group. Propelled by China, the First Global Cross-border E-commerce Conference was held in Beijing from February 9 to 10, 2018. The conference encouraged all parties to take effective measures to strengthen collaboration between the government, e-commerce operators and other stakeholders, which would include promoting platform interconnection and data sharing and expanding single-window participants, exploring the application of new technologies, and improving data visibility and risk management. The conference also highlighted pilot projects such as the Electronic World Trade Platform (eWTP) and the African Alliance for E-commerce. Participants also discussed the *Framework for WCO Cross-border E-commerce Standards*[45] drafted under the leadership of China at the conference (http://www.sohu.com, 2018).

From the regional perspective, the ASEAN released the ASEAN Work Programme on Electronic Commerce (2017-2025) on August 14, 2018, with the focus on promoting infrastructure construction, legal framework formulation and international cooperation. The ASEAN Agreement on E-commerce was signed to standardize e-commerce rules for

43 Yudala is an e-commerce company under the telecommunications firm Zinox.

44 The World Customs Organization (WCO) was established in 1952 with the mission of improving the efficiency and efficiency of customs administrations. It currently represents 182 customs administrations around the world and handles approximately 98% of global trade.

45 http://www.sohu.com/a/243792650_100014671

ASEAN member states, promote digital connectivity, and remove barriers for international e-commerce operation. Its goal is to strengthen the facilitation of e-commerce transactions, create a sound credit environment for e-commerce development, and strengthen e-commerce cooperation between ASEAN countries. From the national perspective, all countries need to actively promote the development of cross-border e-commerce by enhancing customs processing efficiency. In October 2018, Panama's National Customs Authority put into use a digital tolling system.

Through the electronic toll collection system, the authority will collect the fees for document copying, customs area storage, document certification, vehicle certification, bill of lading, as well as the fine for violation of customs laws (smuggling and fraud) and the tax payment for confiscated goods. Applications for documents such as the Uniform Transit Customs Declaration (DUT) and the re-export customs declaration fee can also be completed through this system. Panama's Customs Authority has stated that the full implementation of the system is part of the government's plan to improve fiscal transparency. The digital toll system is now also paperless and procedurally standardized, thereby streamlining the collections process, and representing a big step for modernization and transparency. Both logistics and foreign trade enterprises will obviously benefit from it. In August 2018, Russia unveiled a bill to optimize the efficiency of customs clearance oversight and management. The act stipulates that paperless operations will be extended to the declaration of goods and even the entire customs clearance process, and a personal user information system will be established to extend the tax payment period for importing and exporting goods to one month under certain conditions, while also expanding the scope of implementation of the independent declaration and automatic release system. The time limit for customs commodity pre-categorization was shortened from 90 days to 60 days, and the time limit for customs inspection was shortened from 10 days to 1 day.

From the standpoint of platforms or enterprises, many e-commerce platforms or companies have carried out cooperation in areas such as logistics to speed up the development of cross-border e-commerce. Chinese logistics company Cainiao Network has joined forces with partners such as CorreosChile to create streamlined logistics hotlines in several Latin American countries including Brazil, Chile, Colombia and Mexico, which have enabled the delivery speed of packages from China to Chile to increase by 120 percent and from China to Mexico, Colombia, and Brazil to increase by 100 percent. After exploring the Cameroonian market, Jumia signed a cooperation agreement with Campost, which enabled it to use Campost's 234 outlets across Cameroon and its own express delivery system to expand its sales network in the African country.

3.3. Limitations of Traditional Trade and Advantages of Cross-border E-commerce in South-South Cooperation

The limitations of traditional trade are becoming increasingly noticeable in the process of South-South cooperation. Due to its unique advantages, cross-border e-commerce has greater potential to deepen South-South cooperation. Traditional commerce models still maintain a dominant position in Southern countries. However, such models also have certain limitations. Traditional commerce models are more likely to be controlled by transnational companies. From the global perspective, transnational firms control 60 percent of international trade. In this context, most of the profits are reaped by those transnational firms, making Southern countries less able to seize the deserved benefits from international trade. More importantly, small and medium-sized enterprises in Southern countries have little chance to participate in international trade, which undermines the sustained economic growth of Southern countries. However, the arrival of cross-border e-commerce has not only injected vitality into the traditional trade of these countries, it has also led to a slow improvement in the outlook for small and medium-sized enterprises. Because of the convenience of cross-border e-commerce, the countries of the South can effectively use their own resources to create complementary advantages and strengthen trade. At the same time, the lower entry threshold has enabled small and medium-sized enterprises to reap greater opportunities and open other channels for doing business.

Traditional commerce models enable developed countries to consolidate their monopoly on technology and standards. Because of their lower economic and technological development levels, Southern countries usually fail to reach the technological standards of developed countries. Thus, they often face obstacles in technology and standards when attempting to further develop such traditional models. Considering the technological and standard monopolies maintained by developed countries, it is difficult for Southern countries to accelerate their own technological progress and industrial structure improvement by developing trade. Thus, the countries of the South should attempt to learn from the new technologies of developed countries and seek to engage in technical cooperation. Furthermore, Southern countries should strengthen and encourage innovation in operating e-commerce platforms that are suitable for local characteristics, thereby actively creating a better business environment. Nonetheless, disparities in economic development levels cause uneven benefits for different Southern countries within the framework of cooperation, which may generate the Matthew effect, namely "the strong get stronger and the weak get weaker", thus escalating the disparities in economic development.

Finally, traditional commerce models generally suffer from high transaction costs. In traditional trade scenarios, exports need to go through a multi-layered supply chain before reaching the final consumers, and the profits of manufacturers are decreased by

the excessive number of links in the chain. Furthermore, due to more information transfer links, higher information transfer costs, and incomplete information about production and trade, traditional commerce models cannot achieve optimal resource allocation immediately, thereby inevitably increasing transportation and labour costs. This has also hindered cross-border e-commerce cooperation between the countries of the South. The transmission of information has the possibility of time lag and omission, resulting in greater error margins in resource allocation, and additional costs and losses.

3.3.1. Advantages of Cross-border E-commerce

Cross-border e-commerce directly connects sellers and buyers, thus significantly cutting transaction and communication costs and lowering the threshold for small and medium-sized enterprises to integrate into the global value chain. In this way, cross-border trade, which was formerly dominated by large companies, has begun to open up to small and medium-sized enterprises and start-ups. By integrating service providers from the entire industrial chain, cross-border e-commerce platforms optimize all major links in cross-border trade and facilitate the engagement of more Southern countries in international trade.

Cross-border E-commerce Provides More Growth Opportunities for Small and Medium-sized Enterprises in Southern countries

Cross-border e-commerce platforms not only provide comprehensive services such as product information uploading, translation, marketing, customer service, customs clearance, inspection, taxation, currency exchange and warehousing, but also specialized services such as cross-border logistics. Due to their convenience and inclusiveness, this lowers the threshold for small and medium-sized enterprises in Southern countries to participate in cross-border trade in a more convenient way. Many cross-border e-commerce platforms provide an opportunity for small and medium-sized enterprises to open stores online free of charge, thus enabling them to fully engage in the global value chain without enduring the lengthy, complicated procedures of traditional commerce models. Local cross-border e-commerce platforms in Southern countries also offer better opportunities for small and medium-sized enterprises to explore the international market. By way of example, MercadoLibre, the largest C2C platform in Latin America, amassed a total of 52,000 vendors and 50.2 million registered users by 2017, ranking among the global top 50 in terms of page views, with its business reaching 13 countries and regions including Brazil, Argentina, Chile, Colombia, Costa Rica and Ecuador. MercadoLibre even has its own payment system called Mercadopago.

The classified information site OLX serves more than 40 countries, in many of which it occupies a dominant position. Its three largest markets are India, Brazil, and Poland, in which it has controlled approximately 50 percent of the entire market. The platform is free of charge and serves as an ideal choice for small and medium-sized enterprises in

Southern countries to enter the international market. Indonesia's e-commerce platform Bukalapak[46] focuses on serving such enterprises. It has organized many free seminars, both online and offline, for small and medium-sized enterprises from different cities in order to attract them to open their businesses on its platform. It has also invested in SMEs and helped them in their attempts to further explore the market.

By developing logistics business, cross-border e-commerce platforms facilitate small and medium-sized enterprises to participate in e-commerce. For example, Lazada has unveiled its own logistics solution—LEX (Lazada Express), which cooperates with over 100 third-party logistics service providers to build 61 "last-mile" distribution centres. It has also established its own logistics team with 10 logistics centres, more than 80 delivery centres and a "last-mile" delivery team equipped with over 2,000 vehicles. More than 60 percent of the orders it receives can be delivered to buyers the next day. Cainiao Cross-border Logistics, an Alibaba affiliate, has become the world's largest open network for cross-border logistics, and it provides global logistics services for cross-border e-commerce operators.

Cross-border E-commerce Provides Southern countries with Greater Opportunities for Business Model Innovation

Within the framework of South-South cross-border e-commerce cooperation, enterprises have promoted business model innovations based on consumer demand and market environments. For instance, Jumia has established closer relations with suppliers by providing them with financial services. At present, Jumia provides loans for authenticated suppliers based on platform data, as well as basic accounting and inventory management training courses. Through financial innovation in the supply chain, Chinese e-commerce companies such as Alibaba and JD.com provide financial support for online vendors on their respective platforms. India's digital payment company Paytm partnered with China's Alibaba Group to launch Paytm Mall in February 2017, which adopts a full-channel business model. Through this business model, online vendors can connect to offline retailers. Paytm Mall also provides a QR code-based platform, whereby offline retailers can sell their products online. Such QR codes are also found in mortar-and-brick stores, enabling customers to place online orders for commodities that are out of stock in those stores. According to eMarketer, mobile e-commerce is growing rapidly as one of the world's largest economic niches.

46 Bukalapak is a C2C e-commerce platform founded by Achmad Zacky, an entrepreneur in Jakarta, Indonesia in 2010. Now, it is one of Indonesia's largest e-commerce platforms, with monthly individual visits of 53.28 million and monthly page views of 420 million. In January 2018, Bukalapak grew into a unicorn, the fourth Indonesian startup to win the title. The other three were Go-Jek, Traveloka and Tokopedia.

The experience gap between the United States and Latin America creates two huge growth opportunities for the O2O business model. One is to quickly provide new services through mobile device apps, thereby achieving a similar experience with the United States, and generating greater returns. Brazil is set to produce a new business model similar to the U.S.-based Instacart. Consumers will buy grocery products through a mobile device app, and then the merchants will send them directly to the consumer's location within a few hours. In terms of unit economics, Brazil may actually be higher than the United States because of its on-demand services. For example, Brazilian courier wages are much lower than in the United States. In Brazil, early-stage brands have an advantage because of the dearth of availability in similar services. Brazilian consumers are also more likely to go shopping some distance from home, even if it involves crossing heavily trafficked areas or using public transportation. For these reasons, Brazilians may be more likely to pick up their phones and let the couriers complete the shopping process. Compared to e-commerce, Brazil's O2O business model operates better. For example, Buscapé has occupied a large share of Brazilian domestic e-commerce for many years.

Accelerating the Growth of Localized Cross-border E-commerce Platforms and Increasing the Opportunities for Technological and Capital Cooperation

As mentioned above, only a few large e-commerce platforms from developed countries are directly operating in Southern countries. In fact, even globalized platforms such as Amazon have shown obvious advantages in their competitions with local e-commerce platforms in Southern countries—whether in Latin America or in China, India and Africa. This phenomenon demonstrates that cross-border e-commerce cooperation between Southern countries is conducive to fostering localized e-commerce platforms that serve the specific needs of Southern countries. In the South, Amazon has not experienced very positive development. This is in sharp contrast with Amazon's dominant position in developed countries. In Southern countries, the most sought-after enterprises tend to be local, which benefits from the sensitive security awareness and conservative traditional concepts of the Chinese people; on the other hand, the southern countries are different from the developed countries, and the particularities of transportation, customs, and environment have meant that the Southern countries are more likely to cooperate and communicate internally. In addition, the growth of localized cross-border e-commerce platforms in Southern countries increases the opportunities for cross-border e-commerce platforms to carry out technological and capital cooperation. For instance, eBay conducted in-depth cooperation with South America's largest e-commerce platform MercadoLibre to establish eBay official stores on MercadoLibre's sites in Chile and Colombia. Moreover, eBay provided resource and technological support for MercadoLibre. In December 2017, Swedish investment company Kinnevik[47] invested in South Africa's e-commerce

47 Kinnevik is a Swedish venture capital company. Co-founded by Wilhelm Klingspor and Robert von Horn in 1936, it is headquartered in Stockholm, capital of Sweden.

platform Konga, purchasing the platform's 34 percent stake. India's Flipkart obtained huge investment from transnational giants including Walmart.

3.4. Bottlenecks for South-South Cross-border E-commerce Cooperation

Despite its remarkable advantages compared to traditional trade and positive role in stimulating economic growth, cross-border e-commerce in South-South cooperation has shown some potential bottlenecks for future development. The increase in Internet penetration rates is a precondition for advancing South-South cross-border e-commerce cooperation. Due to differences in economic conditions, infrastructure, culture and customs, Internet penetration rates are generally low in Southern countries and sharply contrast each other. Data from Internet World Stats, the Internet penetration rate averages at 48.1 percent in Asia. The Internet penetration rate is low in Afghanistan, at only 15.7 percent, however the figure exceeds 80 percent in both Thailand and the Philippines. For the world's two most populous countries, China's Internet penetration rate reaches 54.6 percent, while that of India is only 34.1 percent. The average Internet penetration rate in Africa is 35.2 percent. The figure is lower than 10 percent in such countries as Somalia, Niger, Madagascar, Burundi, Democratic Republic of the Congo, and Chad. However, the figure is much higher in Kenya, Tunisia, Mauritius, Morocco and Mali, all surpassing 60 percent. Of the African countries, Kenya has the highest Internet penetration rate, at 85 percent. The figure is 50.2 percent in Nigeria, the most populous country in Africa, and 53.7 percent in South Africa. The Internet penetration rate averages 67.2 percent in Latin America. The figure is 93.1 percent in Argentina, and 70.7 percent in Brazil. The above data are taken from the official website of Internet World Stats.

The gap in Internet access casts a negative light on cross-border e-commerce cooperation between Southern countries. While Internet access costs vary in different countries, the relative high costs of ccess in most Southern countries still prevent the majority of local consumers from online shopping.

3.4.1. Disparities in Internet Usage Behavior and Capacity

The knowledge gap in the utilization of cross-border e-commerce between Southern countries remains a persistent problem, extending to the capacity of transacting via cross-border e-commerce platforms, cultural differences between seller and buyer countries, and the ability to understand foreign languages and information about commodities. This knowledge gap has resulted in a shift from the "first digital divide" (namely, the gap in access to the Internet) to the "second digital divide" (namely, the gap in benefits from the Internet). More precisely, the first digital divide refers to the difference in Internet accessibility, namely whether one can gain an access to the Internet or the gap between those who have access to the Internet and those who do not. This has resulted in the aforementioned disparities in Internet penetration rates. The second digital divide refers

to the different specific realms in which users from countries with different cultures, knowledge levels, rules and standards use the Internet despite their similar Internet access conditions. Many Internet users cannot use cross-border e-commerce platforms to make transactions. Therefore, the second digital divide affects the effectiveness and quality of cross-border e-commerce transactions.

Differences in customs and habits between buyers and sellers are also an important factor that influences the development of cross-border e-commerce. By way of example, as one of the most economically significant African countries, South Africa boasts developed infrastructure and an Internet penetration rate of more than 50 percent. However, local consumers have been used to offline shopping, so the e-commerce penetration rate is merely one percent for the country. Data released by the real estate research company Urban Studies reveal that South Africa has over 2,000 shopping malls, with total floor space of 23 million m^2, which has reached a saturation point. Local residents' overdependence on offline transactions has led to little knowledge or interest in online shopping, thus impeding the development of cross-border e-commerce in South Africa. Many South Africans even think that only those with a credit card can shop online.

Language barriers are another factor hindering cross-border online shopping. For example, as cross-border e-commerce platforms explore the Latin American market, they need to provide services in Spanish or Portuguese. However, some cross-border platforms only provide detailed product information in English. Such language barriers are impeding the expansion of cross-border e-commerce.

3.4.2. Restrictions on Cross-border Data Flow

The policy on cross-border data flow refers to a range of basic stances and related administrative measures taken by a country (or region) on cross-border data transmission and processing activities via an information network. The U.S. policy on cross-border data flow is mainly driven by its trade interests, and the E.U. considers its cross-border data flow policy from the perspective of human rights. Compared to the U.S. and the E.U., countries like China and Brazil have formulated their own cross-border data flow policies based on the need to safeguard cyber security and data sovereignty. Many Southern countries have, to varying degrees, put forward their respective data localization measures and even formulated complicated policies on data. International management of cross-border data flows has not led to the creation of a unified framework. In general, foreign countries adopt different management models for different types of data.

The model for hierarchical classification management is mainly divided into three categories according to the degree of prohibition: important data prohibits cross-border flows, general data from the government and the public sector, and relevant industry technical data conditionally restrict cross-border flows, and ordinary personal data allows cross-border mobility. Such measures and policies may affect the development of cross-border e-commerce. Compared to large companies, small and medium-sized enterprises

face greater impact. The policy threshold of cross-border data flow weakens the ability of small and medium-sized enterprises to participate in cross-border business and market innovation. At present, the Asia-Pacific region has established a Cross-border Privacy Enforcement Collaboration Mechanism (CPEA) under the APEC mechanism to promote information sharing and cross-border privacy enforcement cooperation among data protection management organizations in APEC economies. CPEA members include data protection agencies from the United States, Canada, New Zealand, Australia, and other countries. OECD member states have also established a Global Privacy Enforcement Network (GPEN) to address cross-border privacy enforcement challenges and strengthen cross-border privacy joint enforcement cooperation in countries including Canada, the United States, France, New Zealand, Israel, Australia, Ireland, Spain, etc.

3.4.3. Challenges in Logistics and Other Fields

Logistics is a key component in cross-border e-commerce. Generally, cross-border e-commerce logistics can be divided into two parts: international logistics and domestic logistics. In terms of international logistics, limited air freight resources result in huge fluctuations in air transport costs. In terms of domestic logistics, many Southern countries suffer from underdeveloped logistics infrastructure and lack storage facilities, logistics service providers, and a terminal delivery labor force. Due to a lack of evident location indicators, express delivery is hard to reach some routes or regions. For instance, many African residences have no address indicators, making commodities unable to be delivered door-to-door to them. Indonesia has more than 17,000 islands, many of which are remote and can only be accessed via small aircraft. In this case, logistics costs may be even higher than the price of the commodities purchased. Moreover, third-party logistics companies in these regions are incapable of providing high-quality services, with a package loss rate as high as 40 percent. As an example, because of the long distance between China and Brazil and the low efficiency of Brazilian customs, it takes more than 20 days for a product purchased online to be transported from China to Brazil.

3.4.4. Problems with Customs Clearance Efficiency, Taxation Systems, Technical Standards, etc.

Customs clearance efficiency is an important factor that has a ripple effect on the efficiency of cross-border e-commerce. Compared to traditional commerce, which features large purchase volumes, long delivery period, and low transaction frequency, cross-border e-commerce is characterized by a small quantity in a single purchase and a high transaction frequency. It has a higher demand for logistics methods such as air freight, postal services, and express delivery, and requires higher customer clearance efficiency. According to the WTO Customs Law, detailed customs declaration forms must be submitted to the customs checkpoint within 30 days after the goods are registered to the warehouse (except statutory holidays). If a detailed customs declaration is not submitted before the deadline, the goods should be placed under customs-specific management.

However, Southern countries vary sharply in terms of customs clearance efficiency. China, Malaysia, and Thailand rank among the top in customs clearance efficiency, followed by Brunei, Vietnam, Indonesia, Cambodia, Myanmar, and the Philippines. Customs processing in countries such as Laos and Brazil are marked by low efficiency. For example, the Kenya Bureau of Standards (KEBS) began implementing the pre-export standard compliance verification programme on September 29, 2015. Therefore, PVOC has been adopted as a pre-shipment verification method since 2015. Products in the PVOC catalog must be compliant (CoC) prior to shipment. CoC is a mandatory customs clearance document for Kenya. Without this certificate, the goods will be refused entry after arriving at the port of Kenya. In Nigeria, the management department stipulates that in order to prevent unscrupulous traders from arbitrage, all imported goods must pass the inspection of the Swiss General Public Bank branch agency before they are issued and obtain a "clean report of findings" so that the consignee can clear the goods.

In terms of taxation systems, high customs tariffs and additional value-added taxes increase the cost burden of cross-border e-commerce platforms, making them difficult to expand in such a disagreeable environment. The World Bank's Ease of Doing Business 2018 report indicates that the taxation systems of many Southern countries are unconducive to the development of cross-border e-commerce, and their extremely high tariff rates and intricate taxation procedures drive away cross-border e-commerce operators. According to the report, countries including Sudan, Ethiopia, Guatemala, Laos, and Algeria ranked among the bottom 20 in terms of the taxation index[48], of which Somalia and Afghanistan took the last two places. Of course, some Southern countries adopt suitable tax policies. Kazakhstan ranks first around the world in taxation index, and India, Malaysia, Saudi Arabia, Colombia, and Thailand also rank among the top. In more recent years improvements have been made in many Southern countries when it comes to the ease of doing business.

The differences in tax burden also affect cross-border e-commerce cooperation between Southern countries. In 2015, Annette Oguto, Director of the South African Taxation Institute and the Director of the Davis Tax Committee, held an annual international tax forum in Johannesburg, South Africa, indicating that developing countries can only wait for developed countries to take appropriate action after drafting the agenda. And the "rules of the game" written by a few countries are likely to exacerbate global tax inequality. In order to curb the erosion of its tax base, South Africa is adopting a variety of anti-tax avoidance measures.

48 The taxation index in the World Bank's Ease of Doing Business report comprises the average time that a company spends on tax payment (hours/year), total tax rate (ratio with profit), after-tax practical flow index (0-100), time needed for value-added tax rebating application (hours), time needed for tax rebating into account (weeks), time needed for corporate income tax auditing and declaration (hours), and time needed for completing corporate income tax auditing (weeks).

In terms of technical standards, considering their disparity and quantity, Southern countries find it hard to unify such standards, thereby increasing the difficulty of platform system maintenance. For example, there are no unified standards for digital identity. It is commonplace that one user may use different identities on different digital platforms, increasing the chance of fraud. Moreover, different countries lack unified standards for data security and data transmission response speed. This may cause conflicts in cross-border e-commerce cooperation.

3.4.5. Lack of State-to-State Cooperation

Although some Southern countries have reached bilateral agreements and trade facilitation agreements, the majority of Southern countries, especially the least developed ones, have not yet been engaged in cross-border e-commerce. These nations still lack a state-to-state cross-border e-commerce operation mechanisms. In the process of promoting cross-border e-commerce cooperation, state-level cooperation is required in fields such as e-commerce platform market access systems, customs and tariff rules, logistics rules and consumer information protection. However, such cooperation depends on what benefits countries involved can derive from cross-border e-commerce as well as the general attitudes among the population toward cross-border e-commerce.

3.4.6. Comparative Regulatory Insufficiency for Cross-border E-commerce

In general, cross-border e-commerce has only recently begun to take off in Southern countries, most of which have yet to establish a set of complete regulations and developmental policies on cross-border e-commerce. On the one hand, due to their existing domestic policy frameworks, cross-border e-commerce must still face high costs in order to develop in Southern countries, such as high tax burdens and ossified policy mechanisms. On the other hand, there are inadequate international regulations on the protection of cross-border consumers' rights and interests, Internet connectivity efficiency issues between different countries, disparities in Internet costs, international logistics, domestic logistics, etc.

3.5. Promoting the Rules, Standards and Capacity Building of South-South Cross-border E-commerce Cooperation

The factors hindering cross-border e-commerce cooperation between Southern countries are categorized into three kinds: First, inter-state regulations impeding cross-border data flow, customs clearance efficiency, taxation systems, and regulations governing state-to-state cooperation; Second, differences in national standards, such as technical standards; Third, limitations of infrastructure capacity, such as Internet penetration rates, knowledge gaps, and consumers' attitudes toward cross-border e-commerce. Only by strengthening

South-South cooperation to remove these obstacles can cross-border e-commerce achieve healthy development.

3.5.1. Building Regulations that Are Conducive to South-South Cross-border E-commerce Cooperation

Cross-border e-commerce cooperation between Southern countries should not repeat the old path of developed countries dominating international trade. On the contrary, Southern countries should attempt to capitalize on the dominant position of their own cross-border e-commerce platforms, promote inter-governmental cooperation based on collaboration of different platforms, and establish rules and systems conducive to the healthy development of cross-border e-commerce. Personal information protection is a major challenge faced by Southern countries in promoting cross-border e-commerce cooperation. In the cooperation process, they need to establish a full set of mechanisms to protect consumers' personal information and data, clarify the basic standards of information protection, and prevent cross-border abuse of personal data and information.

Due to disparities in infrastructure, rules on cross-border usage of Internet and other factors, Southern countries have had to undertake many unnecessary Internet-related costs. Establishing an appropriate inter-network costs sharing system is vital to promoting cross-border e-commerce cooperation. There is currently no inter-network cost sharing system in the Southern countries. Problems concerning cyberspace and payment security will also exert a negative impact on cross-border e-commerce. Building a mechanism to guarantee holistic network security, jointly establishing a cross-border e-commerce anti-fraud system and guaranteeing online payment security are significant components of South-South cross-border e-commerce cooperation.

In terms of enhancing customs clearance efficiency and promoting cross-border e-commerce cooperation, the "single window" service platforms adopted by Southeast Asian countries are worth studying. ASEAN's "single window" platform comprises two levels: National Single Windows (NSW) and the ASEAN Single Windows (ASW). The ASW data sharing system is a regional service platform for ASEAN countries, as well as the first regional "single window" project. The system provides a safe environment connected to the NSW of different countries and supports the exchange of ATIGA Form D and ACDD. Moreover, it has been upgraded to support the exchange of other types of data, thus facilitating cargo customs clearance between participating countries. It is an important project to enhance customs clearance efficiency between ASEAN countries.

3.5.2. Actively Strengthening Standards for Cross-Border E-Commerce Cooperation

There are sharp contrasts between countries in terms of the protection of consumers' rights and interests. It is important for South-South cross-border e-commerce cooperation to reach consumer protection agreements and improve standards on online consumers

protection. From a realistic perspective, e-commerce platforms can expand their practice in protecting online consumers and take the lead in carrying out cooperation and forming relevant standards before achieving state-to-state cooperation.

The rules of e-WTP[49] proposed by Jack Ma, chairman of Alibaba Group, at the 2016 G20 summit, are an ideal reference for formulating cross-border e-commerce standards. A worldwide e-commerce platform launched by a private sector entity and joined by various stakeholders, e-WTP aims to promote public-private dialogue, accelerate the establishment of relevant regulations, and create substantive, effective policy and business environment for the healthy development of cross-border e-commerce. As an ecosystem based on cross-border e-commerce, the e-WTP platform consists of three levels. First, in relation to rules, Cross-border e-commerce involves at least two countries. Due to their different national interests, those countries differ in legal structure, especially when it comes to issues such as taxation, settlement and regulation.

They need a platform or mechanism to overcome such divergences. Second, in terms of business, all parties involved need to carry out business exchanges and cooperation relating to the digital economy and e-commerce and establish new types of Internet infrastructure such as e-commerce platforms, financial payment, logistics and warehousing facilities, foreign trade integrated services, marketing, and education and training. Third, with regard to technology, countries need to work together to establish an e-WTP technical framework based on technologies such as the Internet, big data, cloud computing, the Internet of Things, and artificial intelligence. These three levels are closely interconnected and support each other. The content discussed at the level of rules mainly derives from practices occurring at the level of business and the level of technology, and its outcomes and consensus will accelerate digital economic and commercial cooperation and technological innovation.

Looking to the future, Southern countries may actively promote the construction of pilot Digital Free Trade Zones in cross-border e-commerce cooperation.

3.5.3. Actively Strengthening Capacity Building for Cross-border E-commerce Cooperation

Southern countries should actively promote capacity building concerning cross-border e-commerce through comprehensive cooperation.

First, Southern countries need to cross the second digital divide. Disparities in the Internet access levels of various countries have resulted in the first digital divide. With the continuous

49 Electronic World Trade Platform (e-WTP): proposed by Jack Ma, chairman of Alibaba Group, at the 2016 G20 summit.

decrease in Internet access costs, and due to the efforts of the international community, the gap in Internet penetration rates between different countries is narrowing, which will finally lead to the elimination of the first digital divide. However, the second digital divide has begun to emerge, which essentially pertains to the capacity to use the Internet. This means that due to differences in consumption habits, knowledge and educational levels, concern for security, and divergent levels if confidence in online consumption, there is a huge divide between various countries in terms of the development of cross-border e-commerce. This is the most salient embodiment of the second digital divide. Therefore, we need to establish a cooperation mechanism and enable all countries to take advantage of cross-border e-commerce in order to promote their domestic economic growth and improve the wellbeing of their populations through education, publicity, and technical training.

Second, Southern countries need to optimize inter-regional infrastructure connectivity in order to enhance the development level of their respective service industries. Southern countries vary sharply in terms of infrastructure with regard to transportation and telecommunications, as well as the degree of connectivity. Meanwhile, these nations need to develop their service industries and improve the relevant service systems, including logistics and information service, so as to give full play to the role of cross-border e-commerce in fostering economic development and the growth of small and medium-sized enterprises.

Finally, Southern countries need to apply greater importance to technological innovation and business model innovation related to cross-border e-commerce. Every link of cross-border e-commerce is dependent on continuous technological innovation in fields such as information technology, Internet security, online payment, and logistics. This means that Southern countries must promote in-depth cooperation and logistics, as well as innovation in shipping and service provision in keeping with their own infrastructural conditions. In the course of promoting cross-border e-commerce cooperation, Southern countries should actively push forward innovation in the supply chain according to their endowments in labour force and natural resources and their industrial development levels. In terms of platform operation models, they need to develop innovative cross-border e-commerce platforms and other kinds of specialized platforms suitable for their own domestic situations, so as to constantly enhance their competitiveness in cross-border e-commerce. From the perspective of government, they need to engage in a range of international cooperation initiatives in order to lay the necessary foundation for business model innovation.

3.6. Concluding Remarks

Through the analysis of the current status and the cooperation levels pertaining to cross-border e-commerce in Southern countries, this paper summarizes the background of cross-border e-commerce cooperation and development in Southern countries, and it analyzes

the shortcomings of traditional trade models as compared against the advantages of cross-border e-commerce. We believe that the main platforms for cross-border e-commerce in the South are developed locally in the South, which provides a good basis for cross-border e-commerce cooperation between these countries. We also provide an analysis of the risk points in terms of Internet penetration rates, logistics, customs, taxes, technology, rules, culture and security, and proposes regulations, standards, and guidelines. It is our belief that Southern countries should establish rules that are conducive to cross-border e-commerce cooperation and promote the rapid development of e-commerce.

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Appendix: Challenges to the Dispute Settlement of Cross-border Electronic Commerce Contracts

With the rapid development of cross-border e-commerce, the settlement of related disputes is facing many challenges. At present, traditional contract disputes are mainly resolved through negotiation, mediation, arbitration, litigation, and other means. However, such dispute resolution methods are facing greater challenges when dealing with e-commerce contracts. E-commerce contracts are usually concluded electronically, however the existing methods of contract dispute settlement are all off-line, so resolution of online disputes seems to be relatively weak. The principles of private international law adopted in arbitration and litigation, in particular, have been greatly impacted by cross-border e-commerce.

1. Absence of Law

At present, few countries have drafted legislation on e-commerce. Only a few developed countries have established relevant legal procedures with regard to contract forms, data messages, expressions of will, electronic signatures, and other legal issues related to electronic commerce contracts. Many countries, especially developing countries, clearly lack relevant legislation.

The absence of a legal framework means that both contracting parties lack the basis for resolving disputes once they occur. This phenomenon is referred to as an absence of applicable law, i.e., once a conflict of law arises in any dispute, which would thus determine which country's law should be applied as the applicable law, it may be found that said country lacks the corresponding legislation.

2. Difficulty in the Selection of Laws

For disputes arising from cross-border commerce, traditional private international law adopts the method of determining and identifying disputes through the conflict of laws, choosing an appropriate connection point, and then assigning dispute-related issues to a national law according to an identifiable point of connection, or by directly applying international treaties. The main links to private international law can be divided into territorial connecting points, human connecting points and subjective connecting points. These connecting points have witnessed some changes within the framework of the network environment.

Territorial connecting points. The certainty and uniqueness of territorial connecting points are very tangible in physical space and are closely related to the attributes of physical space itself. However, in the cyberspace constructed by the Internet, the conceptual

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meaning of space becomes weakened. The Internet connects computers worldwide and constructs a vast cyberspace. Technically, it is therefore difficult to determine the territoriality of a contract, and it is possible to have multiple territorial connecting points at the same time.

Human connecting points: Internet users are often anonymous. Therefore the role of any human connecting points becomes weakened.

Subjective connecting points. Due to the weakening of objective factors such as territorial and human connecting points, cross-border e-commerce has to adopt a subjective way to determine a connecting point, namely, the applicable law agreed to by both contracting parties. Even the traditional standard of "reasonable connection" has gradually weakened, and the legislation of some countries unconditionally allows autonomy of the parties.[50] However, this kind of selection is often made by sellers, that is, e-commerce operators, through standard terms, and there exists a possibility of infringing consumers' rights and interests. Therefore, the validity of such selection of applicable law clauses also becomes uncertain.

3. Jurisdiction

Jurisdiction in cross-border e-commerce disputes refers to the qualification of a country's courts or other judicial structures with jurisdiction to accept and adjudicate such disputes. In the jurisdiction of cross-border e-commerce disputes, there are greater possibilities to venue shopping. Venue shopping refers to the phenomenon where the parties choose to file suit in the courts of their own countries. Venue shopping is not unique to cross-border e-commerce, however it has often occurred in various private international law cases. In cross-border e-commerce cases, due to the global characteristics of the Internet, such cases often involve courts of many countries, with several courts having parallel jurisdiction.[51] The arbitrariness of a plaintiff's choice of venue can result in considerable inconvenience for the court, in terms of accepting and adjudicating cases, and for the defendant in terms of responding to a lawsuit.

4. Service Abroad of Judicial and Extrajudicial Documents

In order to resolve cross-border e-commerce disputes by traditional methods, it is necessary to collect, serve and submit evidence extraterritorially. At present, the submission and effectiveness of evidence via electronic media is not recognized by the laws of most countries. Except for a few developed countries, most countries do not recognize electronic service as an effective means of serving litigation documents, which makes the service of cross-border e-commerce disputes difficult. In addition, the evidence of e-commerce

51 See Xiao Yongping and Li Chen: "Challenges of Private International Law in the Internet Environment." Chinese Social Sciences, No. 1, 2001, PP. 100-112, 207.

disputes often exists on the Internet in electronic form, but such evidence is often not recognized under current laws. If the parties are required to obtain evidence in physical form, the parties must go abroad to collect evidence, which may be extremely unfeasible.

5. Exterritorial Execution

After cross-border electronic commerce disputes are settled through arbitration or litigation, they need to be recognized and enforced by foreign courts. However, because the connecting points in cross-border e-commerce disputes are too vague and have more jurisdictional bases, domestic courts may consider themselves to have jurisdiction in the case. In the theory of private international law, the qualified jurisdiction of the court rendering the opinion is the first condition for recognition and enforcement of its judgement. Therefore, in cross-border e-commerce disputes, if the plaintiff chooses a court with weak or disputed jurisdiction and it has substantive disputes to prosecute, it is likely that the court in the place of enforcement will consider that the court chosen by the plaintiff has no jurisdiction, which will result in the decision not being enforced.[52]

52 See Xiao Yongping and Xie Xinsheng: "ODR: A New Model for Resolving Electronic Commerce Disputes." China Law, No. 6, 2003, PP. 146-157.

CHAPTER IV

Smart Contracts: Trade Facilitation and Smart Supervision in South-South Cooperation[53]

4.1. Introduction

Smart contracts, which execute automatically when certain conditions are met, have begun to transform international trade activities. Evidence from a number of proof-of-concepts (PoCs), prototypes, pilot projects[54], as well as actual deployments in domestic trade transactions and in the contexts of North-South and South-South international trade, indicates that smart contracts bring a wide range of benefits. These include an increase in efficiency, easier access to finance, and reduction in various costs associated with international trade activities. Most of the smart contracts are powered by blockchain, a kind of distributed ledger technology. Economies in the Global South are especially likely to benefit more from this technology.

Before proceeding further, it is important to explain blockchain and some related concepts. Put simply, blockchain can be viewed as a decentralized ledger that maintains records of a transaction simultaneously on multiple computers. After a *block* of records is entered into the ledger, the information in the block is mathematically connected to other blocks. In this way, a chain of immutable records is formed (Yaga et al., 2018). Due to this mathematical relationship, the information in a block cannot be changed without changing all blocks in the chain. Any alteration of information in a block would create a discrepancy that is likely to be noticed immediately by others in the network. To ensure that only authorized users have access to the information, blockchain systems use cryptography-based digital signatures to verify identities. Users sign transactions with a private key which is generated when a user creates an account. Using complicated algorithms, blockchain systems also create "public keys" from private keys to make it possible to share information. Public keys are known to the public. However, only the person who has the private key can spend the bitcoin in the account (Kshetri, 2018b).

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53 The author is extremely grateful to Dr. Hany Gamil Besada and participants at the Private Session: Finance Center for South-South Cooperation Annual Report Seminar: South-South Cooperation in a Digital World (December 2018) for their detailed, generous and insightful comments.

54 A PoC is conducted to demonstrate the feasibility of a method or an idea in order to assess the practical potential of a concept or theory (e.g. the benefits of using smart contract in international trade). A PoC is generally conducted in a small-scale. In a prototype, a product is built to test the concept or process. A *pilot project* entails a small-scale implementation in an initial phase in order to prove the *project*'s viability.

Blockchain's distributed ledger networks involve no centralized control over data and thus do not require record-keepers to trust each other. Thus, data cannot easily be tampered with, and once a record is posted, it cannot be changed. In this way, the dangers associated with data being stored in a central location by a single owner do not apply to blockchain. Blockchain's key characteristics, such as decentralization, transparency, immutability, traceability and trust enable secure transfer of value in any process or transaction. Blockchain is also touted as a technology that can possibly provide a robust and strong cybersecurity solution and high level of privacy protection (Schutzer, 2016). Its proponents argue that this technology is secure by design (Kshetri, 2017c).

While applications of blockchain such as cryptocurrency transactions are difficult to track, they are not completely anonymous (Kshetri, 2018c; Kshetri and Voas, 2017). There are various sources of unwanted personal information leaks in transactions involving cryptocurrencies. All transactions are recorded in a permanent public ledger. For example, after the bitcoins are moved from that address, financial movements can be traced. Users can be traced through IP addresses and money flows. Individuals and organizations are likely to suffer more damage from cases of privacy violation if they engage in illegal behaviors using cryptocurrencies when compared to other transaction models. For example, if someone is caught in a crime, the cryptocurrency account can be linked to any crime committed by that person in the past. Privacy breaches are likely to lead to more severe criminal consequences which is referred as an amplified technical impact. The global trade finance market, which is valued at USD 18 trillion, is especially likely to be transformed by the blockchain and smart contracts by disintermediation[55] and other efficiency measures (Kshetri, 2017a, b). As an example, in February 2017, the multinational bank ING and French multinational investment bank and financial services company Société Générale successfully tested a blockchain-based trade finance prototype solution, which was called Easy Trading Connect.

The trial took place on a transaction between the two banks and Mercuria, a Switzerland-based global commodities trading corporation. An oil cargo shipment containing African crude sold to the Chinese petrochemical company ChemChina was processed. According to the two banks, the solution performed well in terms of assessment criteria such as elimination of documentary fraud, reduction of costs, and improvement in efficiency. The trade involved the banks, traders, an agent, and an inspector (BI Intelligence, 2017). The prototype allowed all these parties to execute their roles directly on the platform. The prototype reduced the time taken by a bank to execute its role in such a transaction to 25 minutes from an average of three hours (BI Intelligence, 2017). While this test was for an oil transaction, the steps involved in

55 It involved reduction or elimination of the use of intermediaries between producers and consumers such as certification agencies and trade finance companies.

trades of other commodities are the same. This would allow the platform to scale easily (Acheson, 2017). It also reportedly led to cost savings of up to 30% (Schaps et al., 2017).

Blockchain-based solutions such as Easy Trading Connect thus help reduce the costs of international trade and increase speed and efficiency. In the above example, the African crude oil producer, the Chinese petrochemical company (ChemChina), as well as other players in the entire value chain of oil can benefit. The solution was also reported to perform well in terms of replicability. ING and Société Générale were reportedly negotiating with traders in liquefied natural gas (LNG) industry to test the solution (Schaps et al., 2017). Other GS economies in Africa and other parts of the world, as well as other commodities sectors, are thus likely to benefit from solutions such as these. The actual implementations of such systems have also already taken place. In May 2018, HSBC issued a letter of credit for U.S. food and agriculture firm Cargill using a blockchain-based platform developed by a blockchain start-up R3 called Corda. The transaction involved a bulk shipment of soybeans from Argentina to Malaysia.[56] It was arguably the world's first blockchain-based trade finance transaction. According to HSBC and ING, the exchange was performed in 24 hours, as compared to the five-to-10-day period involved using a paper-based system (Browne, 2018).

Others have built more sophisticated solutions that connect more diverse and larger numbers of participants. In early 2017, with support from the UAE's Dubai Customs and the trade facilitation body Dubai Trade, IBM worked with a telecommunications service provider, a letter of credit (LoC) issuing bank, a responding bank, a freight company and an airline in order to conduct a trial of a blockchain-based transaction. The blockchain platform Hyperledger was used for the smart contracts. The platform interconnected all the parties involved. The plan was to integrate the system with IBM Watson's artificial intelligence (AI) after completing the supply chain and trade finance PoC. It was reported to be among IBM's most visible blockchain projects (Del Castillo, 2017a). The PoC was designed to track the shipment of fruit from India to Dubai via a cargo ship. In Dubai, the fruit would be processed to produce juice and then exported to Spain by an airplane. To move the transactions to blockchain, the UAE-based telecommunications service Du tracked data via the Internet of Things (IoT) [57]-enabled devices. The Emirates-based NBD Bank would issue the LoC., while the Spanish bank, Santander, would receive the letters. The freight company Aramex would ship the fruit and an airline company would transport

57 The IoT is a network of physical objects or 'things' (e.g. machines, devices and appliances) embedded with electronics, software and sensors. Each object is provided with unique identifiers and possess the ability to transfer data across the Web with minimal human interventions. There are three components of an IoT service: the edge, the platform and the user. The edge is the location where data originates or is aggregated. The data then goes to the platform, which is typically in the cloud. Analytics are often performed in the cloud using algorithms. A real-time data streaming decides if some actions need to be taken right away or if the data needs to be stored for future use. The user engages in a business action (Laskowski, 2016).

the juice. Data were reported via Du's IoT devices and validated by IBM's Watson AI.

The above examples provide a glimpse into the roles of blockchain and smart contracts in facilitating trade-related transactions. This chapter provides an overview of blockchain and smart contracts in the context of international trade affecting the GS economies. It analyzes a number of key mechanisms by which blockchain and smart contracts can facilitate international trade in Southern economies. The chapter discusses some key challenges associated with the deployment of such technologies in Southern economies. It also gives special consideration to blockchain's roles in facilitating smart oversight. Also provided are some policy recommendations to strengthen and promote the deployment of such technologies in the Global South.

4.2. Smart Contracts: Definition, Characteristics, Capabilities and Constraints

Szabo (1994) defines a smart contract as a "computerized protocol that executes the terms of a contract". Smart contracts combine "protocols, user interfaces, and promises expressed via those interfaces, to formalize and secure relationships over public networks" (Szabo, 1997). A smart contract guarantees one party that the counterparty will fulfill its pledges. For instance, when a shipment of freight is received from a shipper, it would automatically trigger a payment to the shipper (Matsakis, 2018). In this way, smart contracts can overcome moral hazard problems.

Major differences between traditional contracts and smart contracts are summarized in Table 1. Among the major benefits, smart contracts can dramatically reduce costs associated with verification and enforcement (Yermack, 2017). Other key advantages of smart contracts include higher speed, a high level of precision, higher efficiency, and greater transparency (Reyna et al., 2018).

To take an example, Consuelo is a blockchain-based microinsurance service backed by Mexican mobile payments company Saldo.mx. Customers can pay small amounts for health and life insurance, with claims verified electronically and paid quickly (Valenzuela, 2015). The target groups are Mexicans living within the country as well as the diaspora. Smart contracts send money to the beneficiary only if specific doctors submit a digitally signed death certificate to the blockchain. No claim or paperwork is required. Many of these benefits can be realized because computers are better than human beings in performing repetitive mathematical tasks. Their judgement and intelligence are not affected by factors such as emotions, feelings, wants and needs. They have better memories and are capable of processing large quantities of information (Whitney, 2017).

Table 1: Major differences between traditional contracts and smart contracts

	Traditional contracts	Smart contracts	Remarks
Who writes/ devises the contract?	Legal professionals such as lawyers	Computer programmers	Bugs in smart contract codes
Who executes?	Individuals based on local laws	Automatically executed by a computer program	Many legal systems enforce private contracts poorly: Eliminates the enforcement costs in contracts
Who adjudicates?	A judge	Oracles (often multiple)	Issue related to authentication, security and trust in oracles (Zhang et al., 2016).

4.3. Blockchain-based Smart Contracts

Most smart contract solutions designed to facilitate international trade are blockchain-powered. Indeed, one of the most high-profile future uses of blockchain is likely to be smart contracts. In such cases, a smart contract code is stored on the blockchain. A unique address identifies each contract. Users send a transaction to the address. The correct execution of the contract is enforced by the blockchain consensus protocol. The Southern economies' ICT sector plays a key role in economic development, which is a cornerstone of the achievement of Agenda 2030. The participation of SMEs in the platform economy and digital trade would be particularly important in this regard, since smart contracts and blockchain offer opportunity for improved access and participation of underprivileged and disadvantaged groups in the global digital economy.

Regarding how smart contracts are written and executed, three key challenges have been identified in the non-blockchain world. First, there is the lack of transparency. By way of example, when smart devices automatically perform actions on a user's behalf, the user may not be able to audit the encrypted information that is sent from the device to the cloud. The user's private data could also be sent. Second, a piece of the application is controlled by a single entity. Some infrastructures that support the functioning of the IoT devices may not be available when they are needed. For instance, a smart contract may involve charging credit cards after a user refuels. But the credit card information might be stored by a cloud service, which may not be available. During early 2015-early 2017,

cloud downtimes of major cloud services providers AWS, Microsoft and Google were 448 minutes, 1652 minutes, and 506 minutes, respectively **(**McLaughlin and Sullivan, 2017).

Third, trust is critical in IoT applications involved in the exchange of goods or services. The production of trust may add financial overhead and/or may involve risks related to the violation of trusts. For instance, a vendor may leak credit card information, or the credit card company may collude with a party in case of a disputes (Hanada et al., 2018). Blockchain-powered smart contracts are likely to address these shortcomings. A blockchain-powered smart contract can be executed either "above" the blockchain or "on" the blockchain. In the former, the software programme runs outside the blockchain and feeds information to the blockchain. In the second case, the software programme is coded into blocks (Farrell et al., 2016).

In many smart contracts that are executed "above" the blockchain, effective communication between the underlying IoT infrastructure to facilitate reliable and secure processing of IoT data is critical (Reyna et al., 2018). When blockchain and IoT are integrated into a smart contract framework, the concerned parties need to decide where interactions would take place. Three possibilities can be envisaged: (a) inside the IoT; (b) a design that involves IoT and blockchain; (c) through blockchain. Especially with regard to the first approach, reliable IoT data and low latency in IoT interactions would be required (Reyna et al., 2018). For instance, in IBM's blockchain trial project involving the transport of fruit from India to the UAE and juice from the UAE to Spain, data related to temperatures and other conditions of fruit and juice are reported by Du's IoT devices are validated by IBM's Watson AI. If these conditions meet those specified in the smart contract, the Spanish bank (Santander) would release the payments. The bitcoin blockchain is found to be insufficient for implementing smart contracts. In order to address the drawbacks of bitcoin, new blockchain platforms have emerged that come with integrated smart contract functionality (Reyna et al., 2018). The most widely used smart contract blockchain platform is Ethereum (Buterin, 2013). Ethereum has a built-in programming language that enables the definition of smart contracts and provides decentralized applications. The code in Ethereum's contracts is written in "Ethereum virtual machine code" (Reyna et al., 2018).

A rich ecosystem is developing around Ethereum to facilitate smart contracts. For instance, the security company Quantstamp has launched a security-auditing protocol for smart contracts. The protocol is written in Solidity, which is Ethereum's contract-oriented programming language for writing smart contracts. Quantstamp examines smart contracts through verification software and "Bug Finders". Quantstamp's process, however, is extremely labour-intensive. Source codes need to be reviewed, and specifications must be written manually (Lee, 2018).

4.4. The Role of Oracles in Smart Contracts

A key challenge that arises with smart contracts concerns access to reliable information about the specific contractual conditions. This is because a smart contract does not know about events that occur outside the blockchain environment. Most smart contracts therefore require access to data related to real-world conditions. Such conditions could include temperature, payment completion, price fluctuations, delivery of raw materials at a warehouse, or anything that is associated with the smart contract. So-called oracles provide data related to real-world conditions that are needed to enforce smart contracts. Oracles are the only way by which smart contracts interact with data outside the blockchain (Buck, 2017). Oracles often charge a fee for performing a service.

Oracles thus have a critical role to play in the successful integration of smart contracts in the real world. At the same time, they create complexity. A major challenge is to provide authentication, security and trust in oracles (Zhang et al., 2016). Among the key requirements, the data sources used by oracles to send to smart contracts must be credible (Asolo, 2018). For example, if the term of a smart contract involves the temperature of a location, an a priori choice needs to be made as to which source to believe when two or more sources provide different temperatures. In order to determine whether a given event has occurred, a smart contract may query one or more oracles. Smart contract developers often do not trust a single oracle due to the inherent risk that the oracle may be wrong and/or act unfaithfully (Johnson, 2018). Aggregation of data from multiple oracles is likely to lead to a more accurate view of the data supplied and the real-world conditions specified in the contract (Curran, 2018).

Oracles often use cryptographic protocols in order to evidence that the data they provide have not been altered since they were obtained. Some well-known data sources such as Google or the Yahoo Finance API are not considered to be adequate as oracles because they do not provide cryptographic proof of what was returned to a given query at a point of time in the past (Johnson, 2018). Oracles that can be utilized in smart contracts come in various forms. Some important forms of oracles include software oracles and hardware oracles. Software oracles are typically online sources of information such as temperature readings, and the price of various financial assets. The significance of software oracles lies in the fact that they are connected to the Internet, which allows them to supply the up-to-date information required to execute smart contracts. Hardware oracles, on the other hand, are tasked with sending data to smart contracts when certain events occur in the physical world. Prominent examples of hardware oracles are IoT devices. To take an example, in supply chain management, if an object that has a sensor attached to it arrives at a warehouse, this data can be sent to a smart contract (Asolo, 2018).

There are a number of platforms that tack the oracle problem. For instance, blockchain-based middleware, ChainLink identifies and authenticates data before a smart contract is triggered. Its on-chain interface has 3 components: a) The Reputation Contract stores and

tracks metrics related to oracle service providers; b) The Order-Matching Contract extracts data parameters related to a service level agreement (SLA). It also takes bids from oracle providers; c) The Aggregating Contract collects responses from oracle providers and calculates the final collective result (Curran, 2018).

Many potential challenges of oracles need to be considered. As mentioned, oracles may charge a fee for their services. However, when the outcome of a prediction market has a high value, the opportunity cost of collusion may increase. In such a case, an oracle may find an incentive to collude with a bad actor (Johnson, 2018). Second, the ideal situation would be to rely on multiple oracles. However, this may be easier said than done in some cases. In a niche area, a sufficient number of Oracles may not exist. For high-value smart contracts, the probability of the consensus being manipulated could be too high (Johnson, 2018). Third, in some cases, the information presented by an oracle could have been hacked. In order to address these aspects, Oracles might provide cryptographic proof to ensure that the content of the data is untampered. However, there is also the possibility that a hacker could target the data source feeding the oracle (Johnson, 2018). Finally, errors can occur with even the most reputable companies. There is thus the challenge to ensure that smart contracts are being executed based on correct information (Johnson, 2018).

4.5. Some Constraints in Implementing Smart Contracts

Southern economies face a range of barriers impeding the adoption of smart contracts in international trade. One limitation has been the lack of standards. There are multiple blockchain implementations that are non-interoperable (Deshpande et al., 2017). This could lead to a fragmented ecosystem, which would limit widespread adoption of the technology. For instance, a blockchain-based trade finance service needs to have data standards and protocols in order to share and use data among multiple participants. This situation is further complicated by the fact that buyers, sellers, third parties, intermediaries, and other participants create dates in different formats. The lack of blockchain standards makes it difficult to integrate these diverse sources of data in order to adopt blockchain-based smart contracts (Cullen, 2016). A second challenge that arises in this area is that incorporation of blockchain may require a drastic change in companies' business models. For instance, they may have no more control over their data, and they may have to share their data with business partners and competitors. They also need to devote significant resources to understand the technology and its impact on day-to-day operations.

Third, there has been the lack of education and information. The lack of awareness of blockchain among key stakeholders has been a major concern. In the context of blockchain-based trade finance, regulators in Europe were reported to be knowledgeable about blockchain and they were interested in innovation (Acheson, 2018).

The same cannot be said of regulators in many Southern economies. Indeed, the major obstacles also include the lack of education and information (Valenzuela, 2015). There has been a lack of awareness of blockchain among key stakeholders in Southern economies. For instance, the Georgian Minister of Justice Thea Tsulukiani and other officials noted that the main barrier to introduce blockchain in the country has been educational rather than technical (economist.com, 2017).

4.6. The Roles and Impact of Blockchain and Smart Contract in Trade Facilitation in the Global South

A number of blockchain-based solutions have been launched to facilitate international trade. In August 2018, Maersk and IBM announced that the two companies had jointly developed a blockchain-powered shipping solution TradeLens (https://www.tradelens.com/). The goals which TradeLens envisions are to bring various parties involved in international trade together, support information sharing among them and enhance transparency. As of October 2018, TradeLens had 94 participants that were actively involved or had agreed to be a part of the solution (Hellenic Shipping News, 2018). Many of them are from the Global South. It was reported that customs authorities from Saudi Arabia, Singapore, and Peru had agreed to use TradeLens.

There are a number of other similar initiatives. In November 2018, nine ocean carriers and terminal operators – COSCO Shipping Lines (China), CMA CGM, Evergreen Marine, Hong Kong-based Orient Overseas Container Line (OOCL), Yang Ming, DP World, Hutchison Ports, PSA International and Shanghai International Port, and CargoSmart – announced that they would form a consortium to develop a blockchain-based platform, Global Shipping Business Network (GSBN). The blockchain software will be created by CargoSmart, a software company funded by Hong Kong-based container shipping and logistics service company OOCL (Cosgrove, 2018). OOCL is a founding member of GSBN. Likewise, in early 2018, it was reported that AB InBev, Accenture, APL, Kuehne + Nagel, and a European customs organization had tested a blockchain solution to exchange documents (Kapadia, 2018). While these companies are mainly based in developed countries, some of them have signficant operations in the Global South. In addition, we have discussed above some blockchain-based solutions used in international trades in which most of the participants and beneficiaries are Southern-based.

Among the benefits of blockchain systems in international trades, the potential to reduce the level of congestion in customs clearance to Southern economies deserves particular mention. Such a problem is especially prevalent in Central Asian countries due to cross-border e-commerce-led rapid growth in parcel flows (ADB 2018). Customs handling procedures in Uzbekistan and other countries in the region are often paper-based. Many Southern economies lack a properly developed system to assess and deal with new global

antiterrorism rules and anti-money laundering rules (Dicaprio and Procak, 2016). Many of these challenges can be overcome with blockchain-based systems.

Blockchain systems typically used in international trades are private or permissioned. Using permissioned blockchains it is possible to share real-time data among participants in international trade transactions. Such systems are effective in limiting the participation to only certain members and sharing and managing data among these participants, known as peers. Access to such systems must be granted by some authority[58]. The peers in such supply chains can include customs officials and other relevant government authorities (IBM, 2017). Blockchain systems thus provide easy access to relevant information about the products as well as participants such as exporters, importers and shipping companies. Government agencies can therefore more efficiently and properly enforce relevant rules and regulations. Some solutions are targeted to specific industries. IBM Food Trust is being used by many large-sized food companies such as Nestlé, Unilever, and Walmart. As of June 2018, the system stored data related to 1 million items in about 50 food categories including Nestlé canned pumpkin, Driscoll's strawberries and Tyson chicken thighs (Nash, 2018). By that time, there were more than 350,000 food data transactions on the IBM Food Trust platform (Wolfson, 2018).

In November 2018, IBM commercially launched its Food Trust. Companies of all sizes in the food industry supply chain can join the network for a subscription fee, which ranges from USD 100 to USD 10,000 a month (Biscotti, 2018). Carrefour signed an agreement with IBM to use the solution. The retailer announced a plan to track its own branded products in France, Spain, and Brazil and will expand to other countries by 2022 (Biscotti, 2018).

Documents and processes used in international trade such as letters of credit and bills of lading are characterized by a high degree of complexity and intricate information flows. A typical shipment dozens of people (e.g., buyers, sellers, shipping companies, customs officials, tax officials and health authorities) and hundreds of interactions (Groenfeldt, 2017). There would be a powerful impact even if only a few participants use blockchain-based solutions. However, participation of more actors will lead to a higher network effect and increased power of this solution (IBM, 2016).

Some solutions currently aim to increase the availability of trade finance for domestic trade transactions. The technology and experience gained from this situation can transfer to facilitate international trade in the future. Among the first such measures, in late 2016, India's Yes Bank teamed up with IBM for a blockchain project to digitize vendor financing for its client, India's consumer electrical equipment manufacturing company Bajaj Electricals. India-based FinTech start-up Cateina Technologies developed a blockchain-based smart contract (Kasteleln, 2017).

58 https://www.americanbanker.com/opinion/a-public-or-private-blockchain-new-ethereum-project-could-mean-both

When Bajaj Electricals processes invoices, the details are transferred to Yes Bank on blockchain. As of February 2017, Bajaj Electricals was carrying out transactions with a supplier using blockchain-powered smart contract (Gupta, 2017). When the conditions written in the smart contract are fulfilled, the funds are automatically disbursed to Bajaj Electricals' vendors of after- bill discounting. Following the implementation of blockchain, the process cycle for bill discounting reduced to almost real time from four-five days before (Gupta, 2017). As of mid-2018, fourteen Indian banks had signed up to use the services of the blockchain platform India Trade Connect consortium, which was developed by the local software firm Infosys. The platform facilitates the issuance of loans that are backed by trade transactions (Satila and Anthony, 2018). The banks account for about half of India's internal trade. The solution is expected to speed up processes for approving new loans.

Similar solutions have been launched in other Southern economies. For example, after delivering medicine to hospitals, small pharmaceutical retailers in China often wait up to 90 days to get paid. To meet their working capital needs, they rely on intermediaries that pay immediately but do not pay in full. A USD 100 invoice to a hospital might be worth only USD 90 if they want to get money right away. The intermediary would collect the USD 100 when it is finally paid. Banks are unwilling to lend money in places where fraudulent invoices are common, or where manufacturers and their customers might have inconsistent and error-ridden records. A blockchain system reduces those concerns because these records must be authenticated before being added to the books, and because they cannot be changed. These companies are getting help from Yijan, a blockchain that is a joint effort of IBM and Chinese supply management company Hejia (Kshetri, 2017a). The Yijan platform is expected to bring transparency in the drug supply chain networks. It tracks the flow of drugs and encrypts trading records. The authenticity of such transactions reduces credit risks for banks. Thus, small and medium-sized enterprises (SMEs) in the pharmaceutical sectors can obtain loans from banks at lower rates (Gautham, 2017). Blockchain's impact on international trade and benefits to Southern economies are presented in Table 2. In this section, we provide a brief overview of blockchain's potential roles in facilitating international trade in GS economies.

4.7. Speed and Efficiency

According to the WTO, developing countries can increase the number of new products exported by up to 20% if the global supply chain is streamlined. The rate of increase would likely be 35% for the least developed countries (LDCs) (World Trade Organization, 2017). Since smart contracts auto-execute and auto-enforce agreements between parties involved in international trade, they are likely to be an important driver of efficiency. For instance, when a party completes the actions written in the smart contract, payment is automatically released, and all the ledgers are also updated. This is likely to reduce delays in payment as well as potential breach of contracts (Thomasnet, 2018).

Blockchain solutions can greatly enhance speed and efficiency. It was reported that the traditional trade finance process within India involves processing a large number of documents, which can take up to 22 days. According to India's Yes Bank, blockchain platforms such as India Trade Connect consortium is expected to reduce the time to less than a day (Satila and Anthony, 2018). In December 2016, the Indian bank ICICI executed a blockchain pilot in partnership with Dubai's Emirates NBD Bank (Das, 2016a). Two pilot transactions were conducted. The first was an international trade finance transaction, which enabled all parties of the transaction to access data in real-time. In the pilot, a Mumbai-based firm imported shredded steel melting scrap from a Dubai-based supplier (Das, 2016a). The second was a real-time remittance transaction, in which money was transferred from an ICICI bank branch in Mumbai, India, to an Emirates NBD branch in Dubai. Blockchain is expected to reduce the time taken by cross-border remittances from two days to a few minutes (Das, 2016b).

Table 2: Blockchain and Trade Facilitation in the Global South: Some Key Mechanisms

	Current situation	Blockchain's impact	Example
Speed and efficiency	Based on slow paper-based procedures and a large number of physical interactions	Increases speed by digitizing the process	HSBC and ING: blockchain-based system performed in 24 hours (5-10 days through a paper-based system).
Addressing fraud risk	Evidence of widespread fraud	Blockchain promotes higher level of business transparency and fights fraud	MonetaGo: creates an invoice's hash – if a trader submits the same invoice to more than one trade finance platforms, the hash will match, which raises a red flag.
Access to financing for international trade activities	The ADB: the global trade finance gap USD 1.5 trillion, in 2018.	Smart contracts and single digital records for customs clearance enable SMEs' access to trade finance	OneConnect: can evaluate potential customers creditworthiness by extracting a wide range of company data

Costs of financing international trade	High costs of due diligence lead to high trade finance costs.	Reduces the amount of documentation and manpower needed to process transactions.	OneConnect: can evaluate potential customers creditworthiness at a low cost
Costs associated with paper work and other administrative procedures	Extensive paper work and physical interactions amount to a significant proportion of the cargo's value.	Blockchain-based systems digitize them	ING and Société Générale Corporate & Investment Banking's blockchain-based trade finance prototype solution (Easy Trading Connect): trial of an oil trade from Africa to China: cost savings of up to 30%.
Fairness with which value added is shared among various participants	Unfair sharing of benefits: South based participants are paid unfairly low	Transparency leads to fairness	Moyee Coffee's blockchain system provides proof that living-wage payments were made to the farmers.
Access to international markets for small entrepreneurs from the Global South	Currently mostly inaccessible for people who lack necessary prerequisites such as identification and bank accounts	Some start-ups are launching blockchain-based identification and cryptocurrencies	Humaniq's bio-identification and Humaniq tokens. allows participation in international trade activities.

Sources: Campbell (2017); crunchbase.com (2018); Morris (2018); Moyee (2018)

4.8. Addressing Fraud Risk

An additional benefit is that blockchain-based systems can reduce fraudulent activities. Due to the ease with which trade transactions can be falsified in the non-blockchain world, the use of fake export invoices to disguise cross-border capital flows has been pervasive in many Southern economies. For example, since China has maintained strict capital controls regimes, some importers and exporters falsify trade transactions in order to move capital in and out of the country. Many banks do not check the authenticity of trade documents

(Shengxia, 2014). Between April to September of 2014, China discovered a total of USD 10 billion worth of fraudulent trade transactions (Shengxia, 2014). Some of the major fraud cases occurred in Qingdao, the world's seventh-busiest port. Some firms had used fraudulent receipts to secure multiple loans against a single cargo of metal (Smith, 2015). The Qingdao frauds involved 300,000 tons of aluminum, 20,000 tons of copper, and 80,000 tons of aluminum ingots (Shengxia, 2014). Due to these scandals, Chinese banks charge higher interest rates and have a lower tendency for collateral financing (Smith, 2015). Since there is no single view of trade finance across banks, there is a challenge where one company can approach multiple banks with a letter of credit and fraudulently receive funds from multiple banks using the same letter of credit (Ungerleider, 2017).

According to Global Financial Integrity's (GFI) 2015 report, fraudulent misinvoicing of trade transactions accounted 83.4% of all illicit financial flows (IFF) from developing countries (Kar and Spaniers, 2015). An estimate suggested that between 1988 and 2012, USD 186 billion worth of IFF went out from India through trade misinvoicing (Nguyen, 2014). Ethiopian importers are reported to use fake invoices in order to pay lower taxes on imported goods. In 2017, the Ethiopian Revenue and Customs Authority (ERCA) collected USD 1.6 billion in additional tax revenue by cracking down on fake invoices. (Newbusiness, 2018). About 80% of import invoices were estimated to be fake. Fake invoices mainly involve under-invoicing in order to reduce the amount of tax they pay on imported goods.

Blockchain is an effective tool to fight fraudulent practices such as those noted above. Indeed, recent high-profile fraud cases have increased blockchain's attractiveness for many financial institutions. Standard Chartered, the British multinational banking and financial services company, is reported to have lost approximately USD 200 million from Qingdao-based fraud. Standard Chartered subsequently teamed up with DBS Group and Singapore's Infocomm Development Authority to develop blockchain-based platform (Chanjaroen and Boey, 2016). Other players such as Bank of America and HSBC are also exploring blockchain for trade finance and other applications (Chanjaroen and Boey, 2016).

India's central bank, the Reserve Bank of India, has licensed three entities RXIL, A.TReDS, and M1xhange to provide receivable financing to micro and small businesses. These three platforms wanted to share information in order to prevent fraud but keep the data private. Blockchain can help achieve this. By using blockchain, it is possible to create a cryptographic representation of the invoice, known as a hash. A hash provides an indecipherable text and does not reveal anything about the invoice. It is nearly impossible to convert a hash back to the original data. If a trader submits the same invoice to more than one trade finance platforms, the hash will match, which raises a red flag. New York-based MonetaGo also hashes some of the elements of the invoice in order to prevent the trader from making some modification in the invoice. An invoice that has a high degree of similarity with another invoice already submitted to a different platform will not be

rejected, but it will produce an amber flag. The platform may then ask the trader to explain (Morris, 2018). The Chinese government has asked its banks to take measure to increase transparency and combat fraud in its financial sector by adopting blockchain. Chinese banks are hiring blockchain experts and incorporating blockchain in their operations.

The risks associated with securitization, which involves taking illiquid assets (e.g., debts) and selling to investors, can be more effectively eliminated with blockchain. By digitizing and standardizing the data, data analytics and other tools can be applied. This transparency means that trade finance platforms will be in a position to undertake prudent financing decisions based on more than simple trust in the securitization issuer, which was a main part of the problem in the 2008 global financial crisis (Morris, 2018).

4.9. Access to Financing for International Trade Activities

According to the Asian Development Bank (ADB), the global trade finance gap was USD 1.5 trillion, or 10% of merchandise trade volume in 2018. This gap is expected to increase to USD 2.4 trillion by 2025 (Vanham, 2018). The disparity can be partly attributed to the complexity of the traditional supply chain lending model. For instance, first-level suppliers (the suppliers to the buyer) need to contact lenders for a loan. They use the loan money to make payments to second-level suppliers (suppliers to the first-level suppliers) or to third-level suppliers. In some cases, the number of suppliers in an advanced global supply chain can be as deep as 13 layers. The funds may therefore take many days or weeks to reach the actual manufacturer, which obviously needs the money (Del Castillo, 2017c).

The global trade finance gap can be reduced by USD 1 trillion if blockchain is more widely used. Blockchain-based smart contracts and single digital records for customs clearance are among the important mechanisms that enable SMEs' access to trade finance by reducing credit risks, lowering fees, and removing barriers to trade. Indeed, it is argued that SMEs in emerging markets can benefit more from the implementation of blockchain-based solutions than from the removal of tariffs or negotiation of trade deals (Vanham, 2018). Blockchain can provide SMEs with easier access to low-cost finance, and blockchain-based cryptocurrencies and identification may expand opportunities for small entrepreneurs to access the global market.

As a general rule, banks are not willing to lend money in places where fraudulent invoices are common, or where manufacturers and their customers might have inconsistent and error-ridden records. A blockchain system reduces those concerns because these records must be authenticated before being added to the books, and because they cannot be changed (Kshetri, 2017a). Several efforts have been made to address these challenges. In March 2017, China's Internet financial services company Dianrong and FnConn, launched China's first blockchain platform for supply chain finance, Chained Finance (Das, 2017).

Electronics, auto manufacturing and clothing companies facing difficulties in securing supply chain financing are the test markets for Chained Finance (Kshetri, 2017a). Instead of charging the suppliers, Chained Finance charged peer-to-peer (P2P) lenders a fee to access to the system. Before launching it, the two companies had successfully completed a pilot project and PoC which secured USD 6.5 million funding for Chinese SMEs. Different levels of suppliers are expected to be connected to the system of Chained Finance. The company aims to expand to other Southern economies such as India and those in Africa (Del Castillo, 2017c).

In September 2018, the People's Bank of China launched a pilot trade finance project referred to as the "Bay Area Trade Finance Blockchain Platform" (BATFB) in the city of Shenzhen. Targeted jurisdictions include Guangdong, Hong Kong, and Macau. The banks participating in the project are the Bank of China, China Construction Bank, China Merchants Bank, Ping An Bank, and Standard Chartered Bank. The auto manufacturer BYD is also participating. The majority BYD's suppliers are SMEs, which include 10,000-20,000 tier-one suppliers and even higher numbers of tier two and three suppliers. The latter group, in particular, is reported to have a more significant funding gap. By sharing data between the banks, a firm cannot submit the same invoice to two banks for funding. If an invoice is authenticated by companies such as BYD, it provides credibility for the bank.

4.10. Costs of Financing International Trade

Currently, the high costs of financing prohibit the participation of many Southern-based small firms in international trade activities. These can be often attributed to the high costs of due diligence. For example, due primarily to frauds, bad loans account for about 20% of bank loans in India (Suberg, 2017). Loan fraud cases in the country amount to approximately USD 2 billion annually, which results in higher interest rates due to low levels of trust (Pitti, 2018). Blockchain-led transparency may help reduce these undesirable practices. Blockchain-based solutions can also reduce the amount of documentation and labour needed to process transactions. There have been a range of initiatives on this front. In November 2017, the Hong Kong Monetary Authority (HKMA) teamed up with the professional services group Deloitte and other banks to develop a PoC for blockchain-based platform for trade finance (Perez, 2017). The participating banks include HSBC and Standard Chartered Bank, Bank of East Asia, Australia and New Zealand Banking Group Limited, Hang Seng Bank, and DBS Bank[59].

The platform aims to reduce risks and increase efficiency by digitizing trade documents and automating trade finance processes (Yiu, 2018). Among the key benefits of the platform

59 https://www.scmp.com/business/companies/article/2155683/hkma-and-seven-banks-jointly-launch-blockchain-based-trade

are lower risks related to fraudulent activities and a higher level of business transparency. The risks of duplicate financing can be reduced for the participating banks. The platform was expected to be launched in 2018. Such benefits are especially pronounced if cross-border trade can be facilitated by integrating such platforms with similar trade platforms in other jurisdictions (Yiu, 2018). The HKMA was reported to be working with Ping An to cut paperwork and reduce frauds (Weinland, 2018). OneConnect, Ping An Group's financial technology company, designed the platform. OneConnect has developed blockchain-based platforms that provide financial technology solutions for small and medium-sized banks. The technologies have already been deployed in China (crunchbase.com, 2018).

Blockchain-led disintermediation is another key mechanism that can reduce the costs of financing international trade. Factors are currently key intermediary players in the global trade finance market since they offer money to exporters. Based on pledged future payments, exporters borrow from factors while exporting firms make an outright sale of accounts receivable to factors in order to maintain liquidity. For instance, a Chinese exporter selling to Walmart can take an invoice for those goods to a factor, which can pay the exporter right away. For a USD 100 invoice, the factor may pay as little as USD 90. The upshot is that buyers such as Walmart pay more for goods which they buy from Southern-based sellers. The global factoring market is estimated at over USD 2 trillion annually (Allison, 2016). Venture capital (VC)-funded start-ups, such as the U.S.-based Skuchain, are creating blockchain-based products to address inefficiencies in B2B trade and supply chain finance (PRNewswire. 2016). The products are expected to eliminate the roles of intermediaries and financiers. Buyers and sellers agree on the terms of a deal and blockchain can track and manage the transaction from start to finish (Kshetri, 2017b).

4.11. Costs Associated with Paperwork and Other Administrative Procedures

The companies involved in the export sector must complete mountains of paperwork, which can be especially burdensome and frustrating, especially for SMEs. Activities related to cross-border trade as well as trade finance heavily rely on paper documentation for most processes. Paper-based methods such as LoC and factoring account for about USD 5 trillion of annual trade worldwide (Allison, 2016), 1%-3% of the trade's value being allocated in the purchase of an LoC (Kshetri, 2017b). The LoC involves mailing of physical documents and verification. In 2014, the Danish shipping company Maersk tracked a shipment of avocados and roses from East Africa to Europe in order to understand the physical processes and paperwork in cross-border trade (Baipai, 2017). In most cases, the containers can be loaded on a ship in a few minutes. However, it can be held up in port for many days due to missing paperwork. The study found that a single container to handle

a simple shipment of refrigerated goods from East Africa to Europe required stamps and approvals from up to 30 people such as those in customs, tax officials, and health authorities, all involving over 200 different interactions and communications (Groenfeldt, 2017). IBM and Maersk conducted a proof of concept (POC) in September 2016, which tracked a container of flowers from the Kenyan coast city of Mombasa to Rotterdam in the Netherlands. In the POC, the shipping cost was USD 2,000 and the paperwork was estimated at about USD 300 (15% of the cargo's value) (Groenfeldt, 2017).

Many of the above examples clearly demonstrate that blockchain solutions drastically reduce paperwork and bureaucracy. Blockchain-based solutions and smart contracts also lower administrative costs, such as those associated with physical inspections. In the coffee industry, for instance, the costs related to paperwork and physical inspection are estimated to be as high as USD 0.91 per pound of coffee (Moyee, 2018)). Blockchain-based details provided by Bext360 can drastically reduce these costs.

4.12. The Fairness with which Value Added Is Shared Among Various Participants

The current global value chains are characterized by unfair sharing of benefits, with Southern-based participants often being paid at unfairly low rates. For instance, the global coffee industry has estimated revenues of USD 200 billion. Only 10% of this amount stays in producing countries in the Global South such as Colombia, Ethiopia, Uganda, and Vietnam (Townley, Baltrushes, and Anunu, 2018). Coffee producers are estimated to receive only 2% of the price of a cup of coffee (Moyee, 2018). Some blockchain-powered systems ensure that fair wages are paid throughout the value chain. A solution developed by blockchain start-up Bext360 consists of Stellar blockchain, cloud-based software and smart contracts to track coffee from African farms to coffee shops in Europe and the U.S. (Cadwalader, 2018). The goal is to bring transparency to the supply chains of coffee and other commodities such as cocoa and cotton (Kolodny, 2016). First-hand data related to product evaluation and payment to coffee growers are provided by different participants including farmers' co-ops and Uganda-based coffee exporter Great Lakes Coffee. Specifically, Bext360's business model required that kiosks that evaluate coffee beans be owned by local entrepreneurs and cooperatives[60]. In April 2018, Denver, Colorado-based Coda Coffee sold what it claimed to the world's first blockchain-traced coffee (Food Logistics, 2018).

Dutch start-up Moyee Coffee is using similar solutions. It has teamed up with the blockchain firm FairChain Foundation and Bext360 to launch a blockchain-traced coffee product called Token. By June 2018, blockchain was used to track 60,000 kilograms of

60 https://www.greenbiz.com/article/can-start-up-use-blockchain-brew-more-sustainable-coffee

coffee exported from Ethiopia to the Netherlands (Globenewswire, 2018). Blockchain was used to track the coffee exported, providing proof that living-wage payments were made to the farmers (Globenewswire, 2018). Moyee's plan is to launch Token in Kenya, Colombia, and Rwanda in 2019 (Bryman, 2018). Currently middlemen make decision regarding the quality of commodities such as coffee, and they have an incentive to downgrade the quality. They often set the prices of these products and make decisions as to how much and when farmers growing the crops are paid (Schiller, 2018).

Bext360 has developed sophisticated mechanisms to assess quality and track and validate products. For instance, its Bextmachine is a Coinstar-like device, which employs smart image-recognition technology machine vision, artificial intelligence, IoT and blockchain to grade and track coffee beans. It takes a three-dimensional scan of each bean's outer fruit (Cadwalader, 2018). At collection stations, when farmers pour in their coffee, Bextmachines analyze the cherries and parchment and sort them to assess the quality. The machines grade them for color, size, and other characteristics and compare the image generated of the cherries against a library that contains different types of images. Farmers that supply bigger and riper cherries are paid more. Bextmachines thus assess the quality and give feedback on coffee in an objective way. It makes an offer based on the characteristics and the grower can make a decision to accept or reject the offer. If farmers accept the offer, they are paid immediately to their cell phones (Schiller, 2018).

The Bextmachines link the output to cryptotokens, which represent the coffee's value. New tokens are automatically created when the product passes through the supply chain. The values of tokens increase at each successive stage of the supply chain (Moyee, 2018). The supply chain gains transparency due to this detailed step-by-step process, making sharing the value added among various supply chain participants fairer and easier. Each coffee bean is also provided with a unique ID, which can be used to track coffee beans (Knapp, 2018). Wholesalers and roasters can learn about attributes that may produce certain tastes (Cadwalader, 2018). They can also make future sourcing decisions based on this information.

Some advanced smart contract uses in international trade such as in the above examples are currently deployed in North-South trade. It is, however, reasonable to believe that such applications will stimulate South-South trade in the near future. For instance, Sudan and India are among the biggest importers of coffee from Uganda (Khisa, 2018). Technological development and technological capacity developed by Southern-based coffee exporters (e.g., Uganda) while trading with North-based firms can play a key role in facilitating trade with other Southern economies. There are different mechanisms by which this can take place. For instance, GS-based trading firms are more likely to understand the benefits of blockchain over time and thus influence their Southern-based trading partners to adopt blockchain. Southern-based technology companies may also develop low-cost blockchain solutions that can meet the unique needs of Southern-based traders thereby increasing the attractiveness of this technology.

4.13. Access to International Markets for Small Entrepreneurs from the Global South

The various benefits listed above can be realized only if small entrepreneurs have access to international markets**.** A large proportion of population in the Global South lacks necessary prerequisites such as identification documents and bank accounts to participate in the global trade. The World Bank Group's estimate indicated one billion people lack any form of identification to prove who they are (Desai et al., 2018). According to the World Bank's Global Findex database, about 1.7 billion adults were unbanked in 2017, which means that they lack an account with a formal financial institution or a mobile money provider.[61]

Blockchain-based solutions have been launched to address these challenges. Examples include the U.K.-based blockchain start-up Humaniq's Ethereum blockchain-based app, which creates user profiles based on biometric data such as face and voice recognition algorithms. Humaniq users can complete the bio-identification process in about 20 seconds. The company's initial target audience is in emerging economies with low literacy rates. Potential users are not required to have a passport or an email account. A person can use a smartphone to take a photo of himself/herself and record a video making facial gestures. The user is also required to pronounce a randomly selected text shown on the screen to record voice. Humaniq offers an initial deposit of Humaniq tokens (HMQ) once a consumer completes the bio-identification process. The HMQ tokens can be used as store of value and a means of payment and a medium of exchange on the platform. They can be exchanged with the third-party services utilizing Humaniq such as insurance, data security, small business loans and pensions (Campbell, 2017). The Humaniq app considers the cheapest Android smartphones in mind, so that it becomes affordable to the poor people (Steemit, 2017).

As of September 2018, Humaniq operated in about 50 countries (Hurst, 2018). The company also plans to have a network of local cashiers to exchange HMQ and other cryptocurrencies for local currency (econotimes, 2017). Humaniq's initial offerings will focus on creating an account and core banking services such as remittance payments. Humaniq will release its app code on Github. Third party developers can adapt their services to plug into Humaniq's app (Sproull, 2017). New services such as P2P lending and insurance services will be added at a later date (Bruntinx, 2017).

As an example, Humaniq has provided a case-study of a Nigerian farmer to explain its app's benefits. The farmer lives ninety miles away from the closest bank. He does not have a vehicle. Since he does not have any ID verification, he cannot access or open a bank account. Using Humaniq app, the farmer is able to sell his produce and buy new seeds at a global level if he has a smartphone and Internet access. The costs to the farmer to do

61 https://globalfindex.worldbank.org/#data_sec_focus

all these is a small fraction of the fee that traditional banks or money-transfer companies charge (PRNewswire, 2017).

As another example, in June 2018, the software technology company BanQu teamed up with the multinational drink and brewing holdings company Anheuser-Busch to promote supply chain transparency and traceability in Zambia. The BanQu system is also referred to as Chembe cassava online buying project in Zambia. The partnership started with the cassava crop value chain with an aim to provide economic empowerment to small-scale farmers. Using BanQu solutions, Anheuser-Busch's local business, Zambian Breweries can track its products throughout the supply chain: from the farmer to local businesses to aggregated buyers and retailers. BanQu uses GPS to locate farmers. The located farmers are identified by agents to facilitate and verify transactions. Geo-location tags and farmers' identity profiles and other pieces of information are put on blockchain[62]. The unbanked and underbanked farmers can benefit significantly from the immutable records of economic activities that are linked with their digital profiles. For instance, with this record, farmers can connect with Non-Governmental Organization (NGOs), local cooperatives, microfinance institutions and banks to receive loans, grants and trainings.

The project targets a wide number of farmers (HumanIQ, 2018). The project started with 1,000 farmers in the pilot phase. The number was expected to reach 2,000 in August.2018. The system is projected track 2,000 tons of cassava, used to produce a high-quality starch used in beer (Banqu, 2018). The system also focuses on increasing yields and skills development (Lusakatimes, 2018). Thus blockchain-based economic records can help in capacity building and strengthen farmers' economic identities (https://cryptotvplus.com/banqu-launches-first-ever-blockchain-based-technology-in-supply-chain-management-in-zambia/). Apart from financial inclusion, the project also brings dignity to farmers.

4.14. Blockchain and Smart Oversight

Blockchain can yield significant benefits to government agencies. A potential application is smart oversight and monitoring. In smart oversight, government agencies rely on an independent agent to verify that actors involved in international trade comply with relevant regulations. They can also ensure that they meet environmental and social goals (The world bank, 2018). Blockchain-based platforms hold a big potential to enable smart oversight. Such platforms provide detailed information about regulatory compliance of relevant parties involved in international trade.

62 https://www.craftbrewingbusiness.com/news/blockchain-breakthrough-poor-zambian-farmers-are-now-empowered-within-ab-inbevs-supply-chain/

TradeLens designed by Maersk and IBM uses the Hyperledger Fabric (Allison, 2018). Blockchain platforms such as Hyperledger have built-in mechanisms to facilitate smart oversight. A member organization is responsible for setting up its peers to participate in the network (Manmun, 2018). The peers in such supply chains may also include relevant government agencies (IBM, 2017). Indeed, access to government agencies from the Netherlands and the U.S. was provided in in Maersk's pilot project completed in February 2017, which started with Schneider Electric's empty container in Lyon, France. It was then filled with goods from the plant in the location and sent to Rotterdam, the Netherlands. In Rotterdam, the container was loaded onto a Maersk Line ship and transported to the Port of Newark in the U.S. From there it was sent to a Schneider Electric facility in the U.S. The number of agencies that participated in the pilot gives an idea of the complexity of international shipping. The agencies included Customs Administration of the Netherlands, the U.S. Department of Homeland Security Science and Technology Directorate, and U.S. Customs and Border Protection (Groenfeldt, 2017).

In such systems, auditable data can be provided to satisfy regulatory requirements. Parties engaged in international trade benefit greatly with the reduced regulatory compliance costs (Kshetri, 2018). It is worth noting that a number of government agencies from the Global South such as Saudi Arabia, Singapore, and Peru have agreed to use TradeLens. Government agencies involved in international trades in these economies are thus likely to benefit from blockchain-based smart supervision.

Blockchain-based smart oversight can generate potential added-value in a number of aspects. For instance, costs associated with paper work and other administrative procedures can be drastically reduced since all related documents that are digitalized and authenticated by relevant parties are stored in blockchain, which can be accessed by government agencies involved in international trade. Blockchain-led speed and efficiency can bring benefits to national economies. For instance, delays in export and import due to missing documents and paperwork can be drastically reduced with blockchain.

4.15. Concluding Remarks

Blockchain and smart contracts lead to significant efficiency improvements for all participants involved in international trade. SMEs will not be forced to close their factories or stop production activities due to unavailability of trade finance. Blockchain-based solutions can also bring a wide range of possible benefits to government agencies. For instance, speed and efficiency can be realized with blockchain-based systems' use as smart supervision. Traders in some countries are reported to use fake invoices to minimize taxes. Government agencies can be part of the blockchain-based decentralized system. Such systems can thus help minimize tax losses. Blockchain solutions have

a more powerful impact if they are combined with other technologies. Many Southern economies currently are characterized by a low level of diffusion of related technologies thereby limiting a maximum potential of blockchain in international trade. It is imperative for organization to incorporate advanced technologies such as AI and the IoT in order to gain from the full potential of blockchain.

A broader participation of a wide range of stakeholder is critical to reap the full benefits of blockchain. Examples such as the HKMA's collaboration with local banks indicate that regulators are bringing the banks together to develop blockchain-based solutions for international trade. However, a more likely possibility, at least in the early stage, is that some participants may lack ability and/or willingness to adopt blockchain-based solutions. Over time, we expect positive network effects, which arise when the utility of using blockchain becomes higher with increase in the number of users. We noted above that an increasing number of international traders from the Southern economies are participating in blockchain networks created by more powerful players from the industrialized economies in the North. As noted above, the experience gained can be applied to the South-South trade setting.

A related point is that many of the blockchain solutions are developed by players from the North. For Western multinational companies and developmental agencies, the Southern economies provide a number of opportunities that can be leveraged in stimulating triangular cooperation and realizing philanthropic aims and commercial goals. More effective philanthropic practice will require *identifying the key missing* elements and ingredients in the Southern blockchain innovations landscape and making sure that the they can acquire or develop the missing means. For instance, the critical missing ingredients in the above example involving the transport of fruit from India to the UAE and juice from the UAE to Spain are sophisticated blockchain platforms and capability to validate data for smart contracts. IBM provided blockchain platform, Hyperledger and Watson's artificial intelligence for this purpose. Over time, Southern economies' success in benefitting from blockchain and smart contracts hinges on developing their own blockchain solutions and relevant technologies. Southern economies should significantly reduce reliance on the North-developed technologies by developing their own solutions. Such solutions need to consider unique conditions facing the Global South.

Effective blockchain-based solutions for the Southern economies cannot be optimally designed and developed by vendors based in the North. Southern-based universities, research organizations, and technology companies are better positioned to develop better solutions. In this regard, some encouraging signs have emerged to suggest that Southern-based stakeholders and actors are capable of developing and completely managing blockchain-based innovations without the involvement of Northern-based private sector actors. A number of examples noted above such as the Bay Area Trade Finance Blockchain Platform (BATFB), India Trade Connect consortium and the Indian bank ICICI's execution of a blockchain pilot in partnership with Dubai's Emirates NBD bank prove this

assertion by clear and convincing evidence. Given the newness of blockchain and smart contracts, it is critical that these firms share their technologies, learning experiences, best practices with other Southern economies. International NGOs, developmental agencies and other relevant participants can also accelerate this process and stimulate South-South cooperation by facilitating peer-to-peer learning. Overall South-South cooperation in the fields of blockchain and smart contracts offers the promise of leapfrogging the current technological divide and help speed up the process of technological innovations based on local development needs, capacity, and resources. Finally, organizations in the Global South need to learn about the technologies and business models involved. They need to be prepared for the new challenges in the blockchain era such as transparency and decentralization.

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CHAPTER V

Digital Finance in Developing Economies: a Transformational Opportunity

5.1. Transformational Opportunity of Digital Finance

Digital technologies, including recent advances ranging from artificial intelligence and machine learning to automation and blockchain, are providing new opportunities for all countries to raise productivity, innovate, generate new efficiencies, and create new prosperity and sustainable livelihoods for their populations. In some cases, developing economies that embrace these technologies can leapfrog ahead of advanced economies that use older technologies.

Recent McKinsey Global Institute research has found that both the adoption and the impact of digital technologies have been uneven across sectors and countries. In the United States and Europe, financial services ranks among the most highly digitalized sectors, along with media, professional services, and information and communications technology (McKinsey Global Institute, 2015). Indeed, the marriage of finance and technology has given rise to "fintech", a term used to describe a range of technologies that are disrupting traditional finance. Developments so far have mainly been concentrated in mobile payments and digital banking, but also include AI-driven investment decisions and distributed ledgers applied to settlement and clearing. Fintech start-ups have been attracting growing amounts of venture capital financing that now exceeds USD 13 billion annually (Siobhan Cleary et al., 2018).

Digital financial services are also making breakthroughs in some developing economies.[63] In Kenya, for example, 80 percent of adults use M-Pesa, a mobile phone-based system for transferring money that has since spread to other countries in Africa, the Middle East, South Asia, and Eastern Europe (Vodafone, 2018). China is a leader in mobile payments, recording USD 12.8 trillion in mobile transactions from January to October in 2017, which is more than 250 times the USD 49.3 billion for transactions in the United States for the whole year (Shen, 2018). About 68 percent of Internet users in China make mobile digital payments, compared with only around 15 percent in the United States (McKinsey Global Institute, 2017) .

India also is making strides in digital financial services, enabled in part by its national biometric digital ID program, Aadhaar. Digital identification is emerging as a critical enabler of financial and other services across developing countries and, through Aadhaar, India has

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63 In this article we use "developing" and "emerging" economies interchangeably and our nomenclatures does not distinguish between countries in the Global South. Moreover, in discussing south-south interactions, we use "south" as shorthand for developing economies rather than countries in the Southern Hemisphere.

become one of the pioneers. Digital ID systems could help the estimated 1 billion people globally who lack any form of legally recognized identification to gain access to critical services and thereby participate fully in social, economic or political systems. according to our research. However, the features of digitalization that multiply the value of an identity can simultaneously magnify the risks in the digital ecosystem. Centralization of ID system ownership and consolidation of data raise the risks to cybersecurity; some data breaches have already occurred in India, for example.[64] More broadly, digital IDs could shift the balance of power to those who collect and hold information, and potentially open the door to malevolent use or intrusive surveillance by governments or corporate actors. To avoid such risks, some of these digital ID systems are designed to limit or otherwise constrain the amount of information that is easily accessible to system administrators.

The technological transformation of financial services presents a very significant opportunity to developing countries to improve financial inclusion and, by extension, economic development. As many as 2 billion people worldwide are "unbanked", that is, they do not have an account at a financial institution or through a mobile money provider. Moreover, as many as 200 million micro, small, and medium-sized enterprises across developing regions are either unserved or underserved financially and not able to access the credit they need to grow—a total credit gap we estimate at about USD 2.2 trillion (McKinsey Global Institute, 2016). While microfinance institutions have stepped in to fill some gaps for microenterprises over the past four decades, they also face constraints, including high transaction costs. The lack of financial inclusion hurts not only the poor and middle classes who do not have access to financial services. The heavy use of cash, which accounts for more than 90 percent of all transactions across emerging economies, compared with about 50 percent in advanced economies, also raises costs and results in lost opportunities for providers, as well as creating a leaky pipeline for expenditure and tax collection that invites corruption. The lost opportunities for providers reflect the way that banks and other financial institutions in emerging economies are primarily designed to serve better-off individuals, large businesses, and government agencies. Their lack of modern digitalized systems can limit the ability of these institutions to broaden their pool of customers and assess the creditworthiness of potential new borrowers. As a result, they depend largely on a relatively small customer base and fail to find qualified borrowers; loan-to-deposit ratios in emerging economies average just 62 percent, well below regulatory limits and advanced economy averages.

Digital finance has the potential to fill this financial gap in many developing economies, and as such it represents a significant growth and development opportunity. The technological infrastructure and financial sophistication and regulation that underpin digital financial services can also help developing economies become more financially

64 See, for example, "Details of over a million Aadhaar numbers published on Jharkhand govt website", *Hindustan Times*, July 19, 2017; "210 official websites display personal details of Aadhaar holders: Govt in Lok Sabha", *Hindustan Times*, July 19, 2017; and "20,000 Aadhaar numbers leaked on Punjab govt website", *Hindustan Times*, August 8, 2017.

connected; for now, their connections to the global financial system are more tenuous than those of advanced economies and at times, including recently, subject to volatility that can send flows into reverse.

This chapter focuses on the transformational opportunity of digital finance, which we define as financial services delivered by a variety of digital means including mobile phones and the Internet. We start with a brief outline of technological opportunities in the financial sector. In the second section, we delve into how digital finance can enable broad-based inclusion and boost economic growth. The third section examines the potential for innovation and greater connectedness, including South-South financial cooperation. The final section focuses on challenges and policy implications. While we do not aim to provide a road map or precise prescriptions, we hope that this chapter will provide a useful fact base for policy makers and business leaders of both the opportunities and potential challenges of digital financial services.

5.2 Technological Opportunities for Finance

Digital technologies now touch every aspect of the economy. In the United States and Western Europe, digital penetration is high in some sectors, such as media, retail, and high-tech itself. Yet adoption of digital technologies is uneven. It varies substantially across companies, sectors, and countries—and even the most advanced still have considerable potential to develop. An industry digitalization index that MGI has compiled examines the degree of digital adoption in sectors through three lenses: assets (for example, spending on digital technologies); usage (such as transactions and business processes deploying digital tools); and labour (including digital spending per worker and digitalization of work). Viewed through this index, the United States has achieved only about 18 percent of its digital potential (defined as the upper bounds of digitalization in the leading sectors), while in Europe, that figure is about 14 percent.[65] Developing countries lag even further behind.

Digital technologies are also changing the dynamics of globalization. Cross-border trade in goods, services, and financial flows all grew rapidly for a period of more than twenty years, rising from about 20 percent of GDP in the mid-1980s to more than 50 percent before the 2008 financial crisis. That crisis sharply curtailed these flows, however, and while growth has picked up again after a long hiatus, the momentum has slowed considerably. For 25 years before the 2008 financial crisis, cross-border capital flows—which include lending, foreign direct investment, and purchases of equities and bonds—grew faster than global GDP, rising from USD 0.5 trillion in 1980 to a peak of USD 12.7 trillion in 2007. Since then,

65 *Digital America: A tale of the haves and have-mores*, McKinsey Global Institute, December 2015, and *Digital Europe: Pushing the frontier, capturing the benefits*, McKinsey Global Institute, June 2016. Figures for Europe are a weighted average of six countries—France, Germany, Italy, Netherlands, Sweden, and the United Kingdom—that account for 60 percent of Europe's population and 72 percent of its GDP.

these gross capital flows have fallen by half in absolute terms, to USD 5.9 trillion in 2017. In GDP terms, that is a decline from more than 22 percent in 2007 to 7.5 percent in 2017 (McKinsey Global Institute, 2018).

Yet globalization is not moribund; rather it has gone digital. Cross-border digital flows of commerce, information, searches, video, communication, and intracompany traffic have been surging and connecting more countries, businesses, and people. These data transmit valuable streams of information in their own right, but they also enable other flows of goods, services, finance and people. Digitalization has introduced three new phenomena into the globalization equation: large-scale digital platforms, which reduce the cost of cross-border interactions; purely digital goods and services that are now traded, such as digital magazines and newspapers, online games, and streamed music; and digital "wrappers" that enhance the value of traditional products Virtually every type of cross-border transaction now has a digital component, for example. As a result of this burgeoning activity, Telegeography reports that used cross-border bandwidth has grown by 148 times between 2005 and 2017, to more than 700 terabytes per second -- which is a larger quantity per second than the entire U.S. Library of Congress (McKinsey Global Institute, 2019).

Technological innovation is rapid and pervasive across all sectors including financial services. Evolving financial technologies include digital platforms that create new marketplaces for financial transactions; blockchain—or distributed ledger—technologies that offer a step-change improvement in the efficiency and security of transactions; and smart machines and AI can augment human decision making. For example, QuantumBlack, a data-analysis firm McKinsey acquired in 2015, used a kind of AI called supervised machine learning to help a major bank reduce invoice-redirection fraud. The live product red flags an average of 35 high-risk transactions per day out of the several million processed, enabling the bank's fraud team to focus on transactions that truly warrant attention. Within the first few weeks of live-scoring transactions, the model detected approximately USD 100,000 in fraudulent transactions (Corbo et al., 2017) .

These tools are not without risks. Four main categories of risk are particularly relevant with AI: bias and fairness, privacy, safe use and security, and "explainability"—the ability to identify the feature or data set that leads to a particular decision or prediction (McKinsey Global Institute, 2018). Still, as we outline with some examples below, these technologies have broad potential to revolutionize financial markets, revive growth in cross-border transactions, broaden participation in global finance, including for South-South cooperation, and serve as facilitators of greater financial inclusion. The cost to offer customers digital accounts can be 80 to 90 percent lower than using physical branches; this enables providers to serve many more customers profitably, with a broader set of products and lower prices (McKinsey Global Institute, 2016).

Digital platforms create two-sided markets for transactions, based on mobile phones or the Internet. They can be used for lending or for digital payments and transfers. These

platforms are increasingly used to raise money and procure loans, often across borders (Bughin, Lund and Manyika, 2015). For example, Kiva, a San Francisco-based international nonprofit, has facilitated loans worth more than USD 1.2 billion since its launch in 2005, reaching 3 million borrowers (mainly in developing countries, including Cambodia, Georgia, Pakistan, Paraguay, and Uganda) from 1.8 million lenders—with a repayment rate of almost 97 percent. Most of this volume is in the form of small financial transactions between people who have never met and who live thousands of miles apart (kiva, 2018).

In Asia, fintech person-to-person (P2P) lending start-ups are proliferating, and many of them operate across borders. For instance, Kuala Lumpur-based Crowdo, which launched in 2013, now has more than 20,000 members, with offices also in Jakarta and Singapore. Funding Societies opened an office in Singapore in 2015 and a second location in Jakarta in January 2016. In Japan, CrowdCredit operates a cross-border lending platform for both individual investors and SMEs that can lend in Cameroon, Estonia, Finland, Italy, Peru, and Spain (Fintechnews Singapore, 2016). Lending requirements include credit profiling, which is at times the hurdle for traditional funding. However, digital identification can help overcome such difficulties. In India, for example some P2P lending start-ups use algorithms and integration with Aadhaar for credit profiling. This uses more data points than traditional credit bureaus and tries to quantify not only the ability to pay but also the customer's intention to pay. Furthermore, the process can be rapid, with profiling taking place in less than an hour in some cases (CFA Institute, 2018) .

Platforms are also increasingly being used for digital payments and transfers. Traditional cross-border payments in most regions are typically expensive and slow, and customers increasingly expect real- time, digitally enabled cross-border payments, which are considerably cheaper. A 2015 McKinsey survey found that consumers typically pay a fee of €20 to €60 on top of the prevailing foreign-exchange spread, and even this doesn't guarantee timely delivery of money (Denecker et al., 2016). Although most cross-border payments could in theory be executed in a day or two, the survey found that retail cross-border payments typically took three to five working days to complete. Increasingly this is not good enough for customers, and new forms of competition are putting the traditional model under acute pressure. For example, a co-founder of AirWallex, a cross-border payment start-up, said his firm offers same-day or even instantaneous cross-border transfers at less than one-third of competitors' fees by using the Internet rather than the Society for Worldwide Interbank Financial Telecommunication (SWIFT) network traditional financial institutions use (Kim, 2018). A group of investors including the Chinese Internet giant Tencent as well as Sequoia China, Hillhouse, and Horizons Ventures invested USD 80 million in AirWallex in the summer of 2018 to accelerate its growth in China and Southeast Asia. As in digital lending platforms, partnerships are beginning to emerge in digital payments. In January 2017, BBVA Bancomer, the largest financial institution in Mexico, acquired Openpay, a Mexican FinTech payment start-up. In March 2018, Mastercard acquired Oltio, a South African mobile-payments technology company, to expand in Africa and the Middle East (Mastercard, 2018).

Blockchain technology has been rising in prominence because of its potential to make financial transactions quicker, cheaper, and more secure. The technology is an encoded distributed ledger that contains a digital log of all transactions shared across a public or private network, enabling a permanent, immutable, and transparent recording of data and transactions. It can be used to exchange any number of things that have value, whether physical items or virtual payments, without need for intermediaries and in a secure way. It is well suited for applications requiring a rapid, permanent time and date stamp, such as a range of payments and transfers of financial assets.

McKinsey estimates that achieving clearing and settlement via blockchain could save between USD 50 billion and USD 60 billion in business-to-business (B2B) cross-border payment costs (McKinsey & Company, 2016). Blockchain can also enable P2P lending on both a national and international scale, and blockchain-based platforms are increasingly being used for trade finance. Blockchain platforms are already emerging to enable person-to-person remittances at a fraction of the cost and time involved in traditional money-transfer systems. These technologies may be particularly important for developing economies, enabling them to leapfrog ahead in market architecture.

For example, the service fees and foreign exchange spread traditional money-transfer companies typically charge can consume 10 to 15 percent of the principal amount of small remittances typically made by poor migrants (Ratha, 2006). High fees are a financial burden on impoverished people who rely on these small remittances from family members abroad. Blockchain can eliminate the need for traditional money-transfer companies, opening the door for lean new competitors to offer encrypted, secure transfers at lower cost. In Africa this technology is particularly appealing as it will make financial services available to a greater number of Africans, approximately 80 percent of whom are currently unbanked, according to the World Bank.

Smart machines and AI are the new frontier for financial technology. They can augment human judgement in cross-border investing and have broad applications to provide personalized solutions to customers and massively improve back-office productivity and efficiencies. AI can help address core difficulties holding back financial inclusion: difficulties in verifying identities and a lack of traditional data for underwriting services to vulnerable populations. AI-based financial inclusion products, which are already being deployed, bypass the need for a traditional credit score through analyzing digital footprints. Many FinTech start-ups are entering the alternative credit-scoring space with AI-enhanced solutions, particularly in countries such as Bangladesh and Pakistan where the populations are large and significant portions are unbanked.

Companies such as CreditVidya, ZestFinance, and Lenddo capture alternative data by device, browser, and social media fingerprinting to generate a predictive model of creditworthiness. M-Shwari banking, which leverages the M-Pesa mobile money system

in Kenya, incorporates telecommunications history in its assessment of credit risk. Behind M-Shwari's SMS and Internet- based interface, predictive algorithms leverage several AI capabilities to analyze social and telecom data and assess creditworthiness. The information is then processed in minutes and produces a credit score, which determines the size of the loan allowed (McKinsey Global Institute, 2018) .

A range of AI capabilities can be deployed for these products, including natural language processing, structured deep learning, and person identification of social and telecom data. Neural networks can be trained to recognize an individual's credit risk. Image-processing capabilities can be used as an additional layer of verification to confirm an individual's identity. Structured and unstructured data from sources including social media, browsing history, telecom, and know-your-customer data can be used to train AI models. Solutions are likely to start with external data such as longevity as a telecom customer. The model is then augmented against a client's actual product borrowing performance.

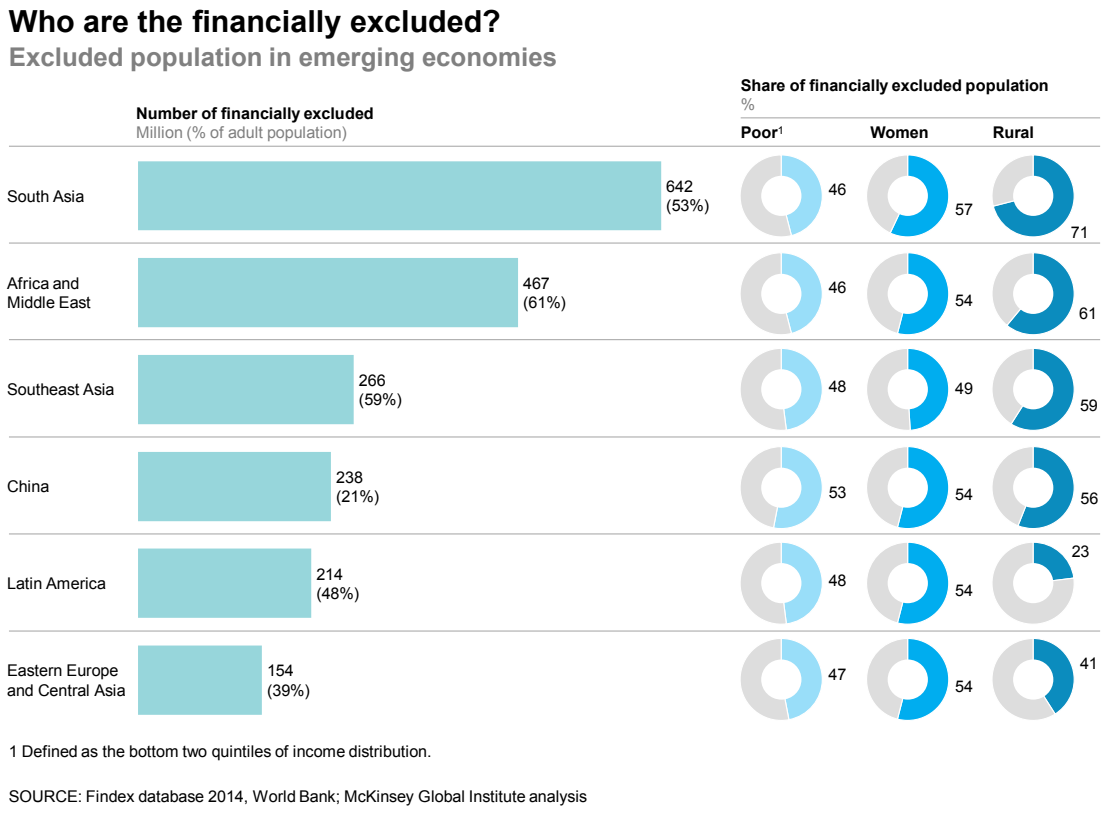
As with all AI programmes, difficult questions will need to be addressed about risks and the potential for misuse. Some concerns are directly related to the way algorithms and the data used to train them may introduce new biases or perpetuate and institutionalize existing social and procedural biases. For example, facial recognition models trained on a population of faces corresponding to the demographics of artificial intelligence developers may not reflect the broader population. Data privacy and use of personal information are also critical issues to address.

5.3 Digital Finance Can Enable Broad-Based Inclusion

As noted, most people and small businesses in emerging economies today do not fully participate in the formal financial system. The size of this challenge is significant. The 2 billion unbanked in emerging economies represent about 45 percent of adults. The share is higher in Africa, the Middle East, Southeast Asia, and South Asia (Exhibit 1). Financial inclusion has been identified as an enabler for seven of the 17 United Nations Sustainable Development Goals .[66]

66 The UN Capital Development Fund identifies financial inclusion as an enabler of the following seven Sustainable Development Goals: eradicating poverty; ending hunger, achieving food security and promoting sustainable agriculture; promoting health and well-being; achieving gender equality and economic empowerment of women; promoting economic growth and jobs; supporting industry, innovation, and infrastructure; and reducing inequality; see "Financial Inclusion and the SDGs", UNCDF.org.

Exhibit 1



1 Defined as the bottom two quintiles of income distribution.

SOURCE: Findex database 2014, World Bank; McKinsey Global Institute analysis

Even those people in developing regions who have basic financial accounts do not use them regularly, because fees are high or because it takes them time to travel to the nearest bank branch. Consequently, these individuals lack access to financial services that people in developed countries take for granted, such as different types of savings accounts, loans, and insurance products. Only 10 percent of adults in developing countries have ever received a loan (World Bank, 2015). This is problematic because field research consistently has shown a strong correlation between financial inclusion and lower poverty rates.[67]

The fallback option for unbanked or underserved people in emerging economies is to rely on cash, and on informal financial solutions that are often less flexible and more expensive than formal alternatives. These include savings in the form of livestock, gold, or informal savings groups, and borrowing from family, employers, or village moneylenders. In India, data suggest that farmers rely on non-institutional sources for more than 30 percent of'

67 See, for example, Robin Burgess and Rohini Pande, "Do rural banks matter? Evidence from the Indian social banking experiment", *The American Economic Review*, June 2005, Volume 95, Number 3; Lasse Brune et al., "Commitments to save: A field experiment in rural Malawi", World Bank Policy Research Paper 5748, August 2011; and Cyn-Young Park and Rogelio V. Mercado Jr., "Financial inclusion, poverty, and income inequality in developing Asia", Asian Development Bank Economics Working Paper Number 426, January 2015.

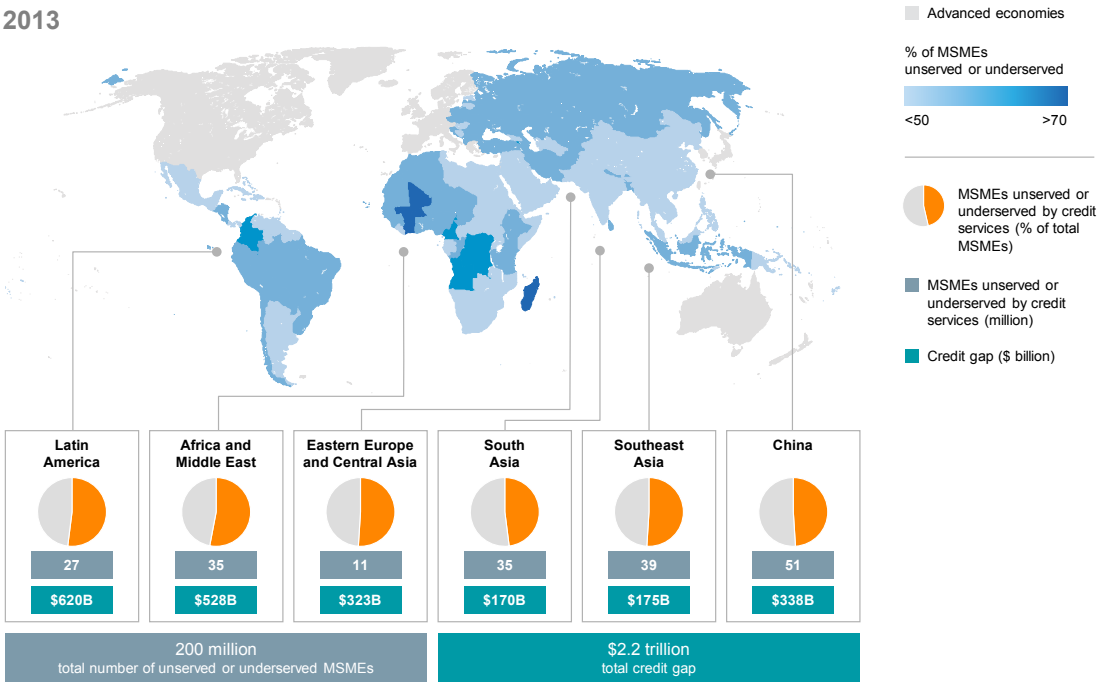
their credit and that interest rates on these non-institutional borrowings are ten percentage points higher on average than bank rates (NSSO, 2013) .

For business, the lack of access to financial products hurts entrepreneurship, investment, economic growth, and social welfare. The problem is not limited to very small informal businesses: medium-sized and small companies in the formal economy, which have the potential to be major job-creation and growth engines, account for about half of the estimated USD 2.2 trillion gap between the amount of credit currently extended and what these businesses need to grow (Exhibit 2), (SME Finance Forum, 2013). Even when businesses can obtain credit, the collateral required tends to be double or triple that in advanced economies, and interest rates may also be substantially higher (Dabla-Norris et al., 2015). Micro, small, and medium-sized entreprises (MSMEs) in emerging economies cite credit constraints as the biggest obstacle to their growth (Global Partnership for Financial Inclusion and International Finance Corporation, 2013).

Exhibit 2

Micro, small, and medium-sized enterprises across developing regions cannot access the credit they need to grow

2013



SOURCE: SME Finance Forum; McKinsey Global Institute analysis

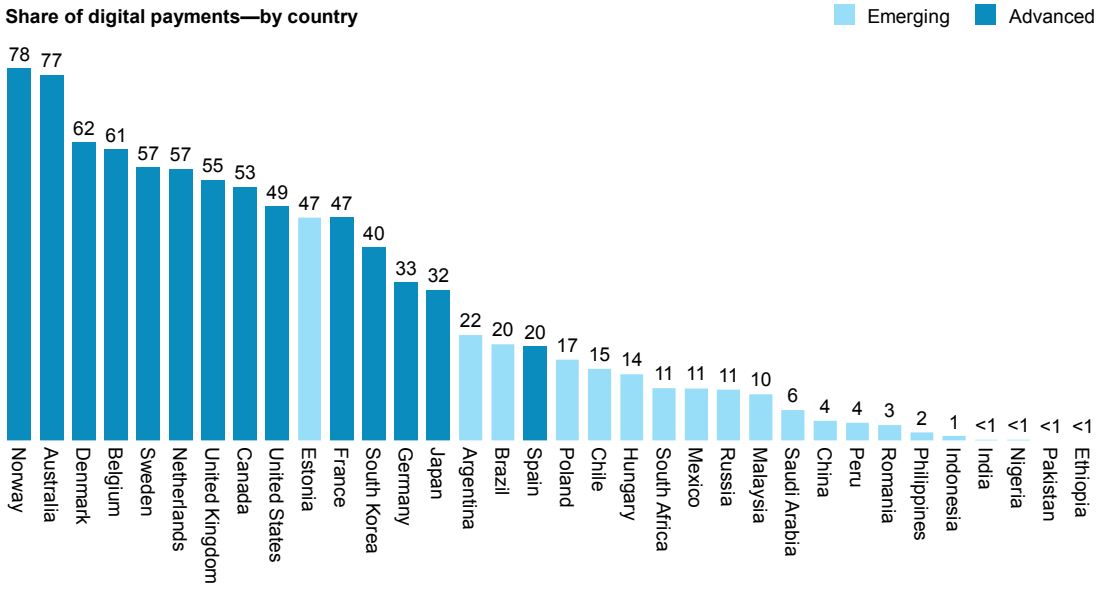
The heavy dependence on cash by individuals and businesses of all sizes, illustrated in Exhibit 3, creates significant costs for financial institutions and reduces the pool of customers they

can serve profitably. Reliance on cash also makes it difficult for financial-service providers to gather enough data to assess the creditworthiness of potential borrowers, further shrinking the pool of customers they can serve. Cash payments reinforce large informal sectors in many developing economies worldwide, from Albania and Guatemala to Thailand and Uganda. This not only hinders competition but also deprives governments of tax revenue and can deter business investment. One study based on an experiment in the Indian state of Andhra Pradesh found that as much as one-third of government cash payments can be lost (Consultative Group to Assist the Poor, 2015). Social programmes built on cash payments and subsidized goods such as fuel and food staples also limit governments' ability to target aid effectively. The International Monetary Fund (IMF) estimates that 43 percent of the benefit of fuel subsidies worldwide goes to the wealthiest quintile and only 7 percent to the poorest quintile (Arze del Granado, Coady and Gillingham, 2010).

Exhibit 3

The vast majority of payments in emerging economies use cash, while digital payments are widely used in advanced economies

% of total transactions by volume, 2014



SOURCE: McKinsey Global Payments Map; World Bank; McKinsey Global Institute analysis

Mobile and digital technologies make digital finance possible, and with the spread of wireless network coverage in developing economies, digital finance is gaining traction. A mobile phone can provide easy access to a digital wallet that could be used for all payment transactions, such as receiving remittances, wages, and government subsidies, making purchases at stores, or paying utility bills and school fees. Using a mobile phone

rather than cash saves considerable travel time and cost, reduces the risk of theft, and increases convenience. It also may give access to a broader range of financial services that can be delivered digitally, such as savings accounts or loans.

Mobile networks now reach more than 90 percent of people in emerging economies. Phone ownership still lags behind network coverage, yet it too is growing rapidly. Today, 62 percent of all people in emerging economies have mobile subscriptions, compared with 55 percent who have a financial account. By 2020, 70 percent of all people in developing markets—equivalent to 96 percent of the adult population—are forecast to own mobile phones (GSMA Intelligence, 2016). For financial-service providers, the cost of offering customers digital accounts can be 80 to 90 percent lower than using physical branches (McKinsey Global Institute, 2016). This makes their services more affordable and accessible for users, particularly low-income users in remote locations, and enables providers to serve many more customers profitably, with a broader set of products and lower prices. For example, the annual cost of providing money transfers by digital means amounts to about USD 3.00 to USD 5.00 annually per customer, compared with USD 50 to USD 100 using traditional bank branches (Voorhies, Lamb and Oxman, 2013). Over time, many people may begin to use their digital accounts to save money.

When individuals and businesses make digital payments, they create a data trail of their receipts and expenditures that banks can use to assess credit risk. This enables financial institutions to underwrite loans and insurance policies for a larger set of customers with greater confidence. Providers can also automatically collect digital payments and send text message prompts to people who miss payments. Research in Bolivia, Peru, and the Philippines found that when companies use such SMS "nudges" household saving rates increase (Karlan et al., n.d). The full suite of savings, credit, and insurance products becomes cost-effective to provide, even for people at low income levels and for very small businesses.

As more people and businesses use digital payments and other digital products, benefits to all users increase, creating network effects that can further accelerate adoption (Voorhies, Lamb and Oxman, 2013). In Kenya, for example, the share of adults using the M-Pesa mobile-money system grew from zero to 40 percent in the three years after the service was introduced in 2007 (Mas and Radcliffe, 2011). M-Pesa's share rose to more than 80 percent by June 2018; four other providers account for the rest (The Communications Authority of Kenya, 2018). The rate of adoption has been much faster than access to traditional financial accounts, which increases slowly as national income levels rise. Using brick-and-mortar branches to significantly expand access to finance could take a generation or more. In contrast, the use of mobile-money accounts shows no correlation with income; indeed, the example of Kenya shows that the highest penetration today is in some of the world's poorest countries. In other countries such as Somalia, digital money transfer services have played a critical role during times of civil strife and economic hardship, even when some banks have withdrawn from the market altogether. As much as one-third of Somali GDP comes from remittances (The Economist, 2015).

Among the benefits of digital finance is the financial empowerment of women. Previous research has found that when women have financial accounts, they tend to spend more than men on food, education, and healthcare, increasing the welfare and productivity of their family (Doepke and Tertilt, 2011). People in towns and cities would no longer have to spend valuable business hours in line at a bank; rural households may forgo trips to nearby towns and spend more time on income-generating activities. One study, in rural Niger, showed that payments made via digital means saved an average of one-hour travel time and more than three hours waiting time per transfer (Aker et al., 2015). Across society, people could better manage their income and expenses, save for big-ticket items like durable goods, invest in their farms and businesses, and put money aside for unexpected economic shocks. In Malawi, farmers whose income from crop sales was deposited directly into accounts spent 13 percent more on inputs for their future crops and achieved a 21 percent average increase in yields from the following year's harvest compared with farmers who were paid in cash (Brune et al., 2015).

Digital payments create an electronic record of sales and expenses, enabling businesses to track and analyze their cash flow in greater detail, streamline supply chains, and better understand their operations and customers. A Stockholm-based payment processor called iZettle, which operates in Brazil, Mexico, and 11 other countries, has a smartphone app that enables small businesses to process payments digitally, track and evaluate sales, and monitor profitability. That helps them to improve their productivity and profitability while also generating digital records of revenue and expenditures they can use to demonstrate their credit quality to lenders. This could enable banks to profitably lend to more MSMEs, helping productive but credit-constrained businesses expand and invest in new technologies.

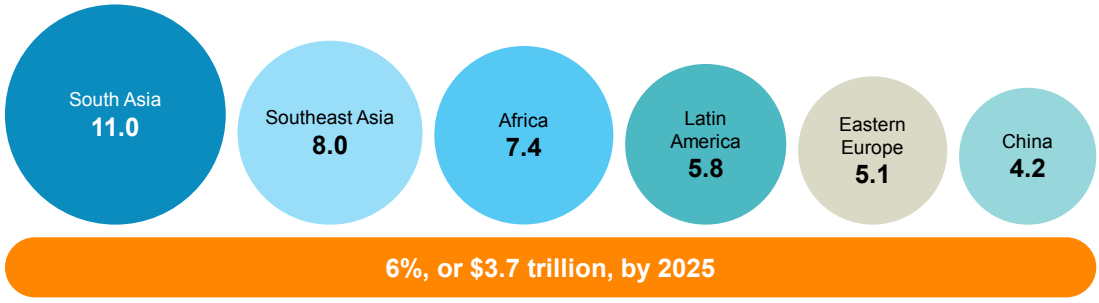
In this way, digital finance promises significant benefits—and an enormous business opportunity—to financial-service providers. The efficiency gains of shifting from cash to digital payments could save them USD 400 billion annually in direct costs. Transitioning from informal savings to digital accounts may attract as much as USD 4.2 trillion in new deposits that could then be loaned out (Brune et al.,2016). In order for the benefits to be realized for all stakeholders will require creation of a dynamic market that is sustainable through banking and business cycles. As we outline later in this article, a dynamic market in turn will need financial regulation that carefully balances the need to protect the interests of investors, consumers, and governments, and give financial-service providers sufficient space for innovation and competition. Sound functioning of a digital finance system will need prudential regulation such as minimum capital ratios and consumer protection measures. Assuming that these and other safeguards are in place, we estimate that the wide adoption of digital finance could increase developing countries' GDP by 6 percent in 2025. Some regions would benefit more than others (Exhibit 4). At the end of 2017, South Asia had the largest number of active account holders, 86.3 million, and the fastest annual growth rate, 55.7 percent. Africa had 18.3 million active accounts, 20 percent more than a year earlier. Latin America and the Caribbean had 11.5 million active accounts, up

14.3 percent from 2016, and East Asia and the Pacific had 7.2 million active accounts, 29.7 percent more than a year earlier (The GSM Association, 2017). Active accounts are those that have been used at least once in the preceding 90 days.

Exhibit 4

Widespread adoption of digital finance could unlock additional economic growth in developing economies

GDP impact of digital financial services[1]
%



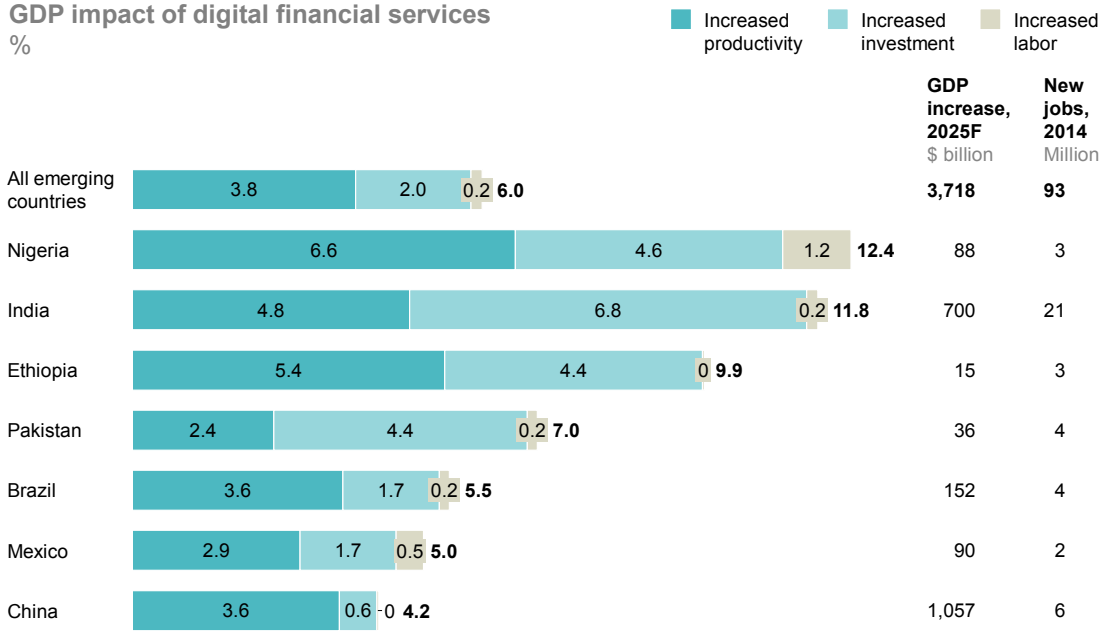
1 Stakeholder benefits are calculated using 2014 baseline values, and GDP impact is calculated using 2025 baseline.
NOTE: Not to scale. Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute analysis

The potential effect on GDP depends on each country's starting point. Lower-income countries such as Nigeria, India, and Ethiopia have the largest potential, given their low levels of financial inclusion and digital payments today. Pakistan's less-developed financial system may require more upfront investment, and thus would not have as large an increase in productivity as some of its lower-income peers. Middle-income countries such as Brazil, China, and Mexico can potentially boost GDP by more modest—but still substantial—amounts, reflecting their higher levels of financial inclusion and digital payments. Of seven countries we studied, China, at 4.2 percent, has the lowest additional GDP potential because its debt levels are relatively high, and it has less room to grow credit further in a sustainable manner (Exhibit 5), (McKinsey Global Institute, 2015). As we note later, the GDP boost will require upfront investment to put in place digital infrastructure, a low-cost and interoperable digital payment infrastructure and other enabling elements, which could be funded by the private and/or the public sector.

Exhibit 5

GDP impact of digital financial services varies significantly across countries



NOTE: Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute analysis

Achieving these GDP gains would require all emerging economies to meet two goals that are ambitious but achievable, based on historical experiences of some advanced economies. First, at least 90 percent of adults would need to have access to financial services, which is the average of advanced economies. Second, they would need to increase digital payments over the next ten years at the same rate that the top-quartile developed countries have achieved over the long term. Depending on where a country starts, this means that digital payments would grow to between 25 and 50 percent of total transactions by volume.

To help achieve these goals, the UNOSSC cooperation is working with partners such as the FCSSC and Fudan University's Six Industrial Research Institute to promote the transfer and diffusion of technology in developing countries and help them to learn from the digital experiences of others. The goal is to create digital economies across the Global South by promoting the development of inclusive finance, building digital financial infrastructure, investing in human capital, and securing necessary knowledge and tools (UNOSSC, n.d).

Nearly two-thirds of the expected growth would come from increased productivity, as businesses, financial-service providers, and government agencies would be able to operate much more efficiently if they did not have to manage cash and rely on paper recordkeeping. Around one-third of the added growth would come from greater investment throughout the economy, as individuals and businesses moved savings out of cash and illiquid savings and into the formal financial system. The additional deposits that financial service providers receive could be used to provide more credit to micro, small, and medium-sized enterprises, and to individuals. The remaining small gains would come from enabling people to work more hours, given they would no longer have to travel to bank branches and wait in queues to make transactions.

Reaching that target would mean that some 1.6 billion unbanked people would gain access to formal financial services. (As many as 400 million others live in sometimes remote rural areas without wireless access and will only be able to access digital financial services once essential digital infrastructure is in place). An additional USD 2.1 trillion of loans to individuals and small businesses could be made sustainably, as deposit bases expand, and financial service providers would have new digital tools to assess the credit risk for a wider pool of borrowers. Governments also would benefit from shifting from cash to digital payments. Developing countries could save roughly 0.8 to 1.1 percent of GDP, equivalent to USD 220 billion to USD 320 billion annually—more than all official development aid to emerging market economies in 2015. And this does not include substantial indirect benefits. Of the total value, roughly 0.5 percent of GDP, about USD 105 billion to USD 155 billion, would accrue directly to government and help them to improve fiscal balances, while the rest would benefit individuals and businesses as more government spending reached its intended targets (Lund et al., 2017).

Economic gains from digital finance are likely to be far larger than our estimates because we have not attempted to quantify the effects of many important dynamics. One is the potential growth impact from improving the quality of human capital in the economy. In India, for example, one study found that the attendance rate of teachers is 90 percent in states with reliable digital salary payments, but only 60 to 80 percent in other states (McKinsey & Company, 2010). Fewer missed days of work improves the quality of both education and healthcare. Digital payments can also help achieve many of the UN's Sustainable Development Goals (World Bank, 2018). Digital payments also can help identify who is evading taxes. If accompanied by stronger government enforcement efforts, this can reduce the size of the informal economy and boost overall productivity. Finally, we have not quantified the benefit of a wide range of business models in finance and beyond, including e-commerce and on-demand services, enabled by digital payments.

5.4 Digital Finance Can Spawn Innovation and Greater Connectedness

Over the long term, digital finance can underpin a broad array of innovative business activities and increase financial connectedness, which in turn could serve South-South cooperation.

First, the increased transparency and information about users generated by digital payments can spawn new types of financial services. New credit-scoring models that assess user data can help lenders to better assess the credit risk of a broader set of customers. Peer-to-peer lending platforms are already putting digital technology to work. Kubo.financiero, in Mexico, matches middle-class and wealthier savers with small businesses and households seeking credit. Prospective borrowers submit requests that are automatically risk-assessed, and lenders can select the borrowers they want to fund. Text messages prompt borrowers when they miss a payment, and delinquency rates so far have been lower than those at microfinance institutions. The lenders, meanwhile, are realizing double-digit returns. Other new apps and digital tools can help businesses analyze their digital sales transactions to improve operations and gain access to cash advance facilities. Some new services provide peer-to-peer social payments across borders in multiple currencies, with transactions being made to any phone number, email address, or social media platform. One Hong Kong company offering this service deploys a built in "chat bot" that leverages AI-based natural language processing technology to support English, Chinese, Japanese, and Indonesian language communications (Hong Kong Business, 2017).

Second, digital payments make small payments often referred to as micro-payments economically viable. This creates new business opportunities. Examples already in place include pay-as-you-go solar power for households, irrigation systems purchased on layaway plans (paying in installments before taking delivery), and school tuition fees broken into small, frequent payments. In Kenya, M-Kopa Solar utilizes a pay-as-you-go model with payment made over the M-Pesa mobile money platform. By not requiring full payment before installation, the programme has enabled 600,000 homeowners across East Africa to install solar panels, which will cut their utility bills by an estimated USD 450 million over the next four years (M-Kopa solar, n.d).

Over the longer term, digital payments can enable the development of e-commerce and on-demand services. Today, most e-commerce transactions in emerging economies require cash payment on delivery. Given their greater convenience, digital payments could spur the growth of e-commerce and unlock consumer spending, particularly in areas where brick-and-mortar retail options are limited (McKinsey Global Institute, 2013).

A thriving and inclusive financial system that has both the requisite infrastructure and regulation is also an indispensable starting point for cross-border financial connectedness and increased SSC. Our research shows that South-South trade is growing faster than

North-South or North-North trade. Overall, trade among emerging economies rose from 8 percent of the world's total in 1995 to 20 percent in 2016 (McKinsey Global Institute, 2018). The financial connectedness of developing economies has grown in this period but remains relatively low compared to advanced economies. In our research we looked at 100 countries worldwide by their total stock of foreign investment assets and liabilities (McKinsey Global Institute, 2017). China is the only developing country with a large stock of such assets. It now a significant investor in many developing markets, including Africa and Latin America. For example, China is currently the fourth-largest— but fastest-growing—source of FDI in Africa (McKinsey & Company, 2017). McKinsey estimates that there are 10,000 Chinese companies now operating in Africa across all sectors, and China is the largest source of bilateral infrastructure financing on the continent, with USD 21 billion outstanding in 2015.

However, other developing countries have far smaller stakes of foreign investment; together, they account for only around 15 percent of global foreign investment and liabilities. Moreover, South-South flows today account for an insignificant portion of the total stock of foreign investment in developing economies—only about 6 percent of FDI stock and 4 percent of stock of foreign equity and bonds—although their share of total flows to developing economies more than doubled between 2006 and 2016 (Institute of International Finance, 2017).

Financial infrastructure is an essential part of the challenge of raising the financial connectedness of developing countries. By enabling savings, digital finance can help stimulate financial markets in developing economies, which in turn can become indicators of financial solidity for investors in other countries. Some academic studies have shown that the size of domestic financial markets has a strong positive association with domestic firms investing abroad. Domestic financial conditions are thus important for stimulating international investment (Journal of International Economics, 2005). More broadly, McKinsey has estimated that deeper capital markets in emerging Asia alone could free up an additional USD 800 billion every year in funding, mostly for medium-sized to large corporations and infrastructure, accelerating economic growth and potentially lifting millions out of poverty. For now, these economies lack access to predictable capital-market funding at scale, their investors lack avenues to deploy long-term savings, and capital markets still play a poor role in efficiently allocating resources (Jain et al., 2017).

International cooperation among developing economies and market innovation can be important levers to accelerate the deployment of digital finance to meet many of the UN's SDGs. To this end, the UN Development Programme has created a Task Force on Digital Finance and the SDGs. UN Environment, working with Ant Financial Services, has created the Sustainable Digital Finance Alliance, a public-private partnership that is exploring specific policy options that can advise countries on how digital finance can help them reach SDG goals, which include the elimination of poverty and reduction of inequality by 2030. These efforts will require close cooperation not only among governments but

also between governments and the private sector, which can provide essential resources, experience, and technical know-how.

5.5 Challenges and Policy Implications

Digital finance can be implemented rapidly and without the need for major investments in costly additional infrastructure. Banks, telecommunications companies, and other providers already are using mobile phones and other readily available technologies to offer basic financial services to customers. Using digital channels rather than brick-and-mortar branches dramatically reduces costs for providers and increases convenience for users, opening access to finance for people of all income levels and those in remote rural areas. For businesses, financial service providers, and governments, digital payments and digital financial services can erase inefficiencies and unlock significant productivity gains.

One of the advantages of digital finance is that it can piggyback on existing wireless networks. But it does require three primary components: mobile connectivity and ownership, digital-payment infrastructure, and widely accepted personal IDs.

Just as the adoption of mobile phones meant that emerging economies could skip the construction of fixed-line telephony, digital technology now enables these countries to avoid building traditional, physical bank branch and ATM networks. To enable broad access to digital financial services, all people—rich and poor—must own a mobile phone and be able to use it wherever they are. Much of the heavy lifting has already been done: across emerging economies, network coverage is generally high, and phone subscriptions and smartphone ownership are both growing fast. Almost 90 percent of people in emerging economies already have mobile network coverage, and a large and increasing share of this is at 3G standard or greater. However, poorer and rural areas continue to lack coverage, or may be limited to 2G coverage or have unreliable service due to power outages at base stations (GSMA Intelligence, 2016). In some of these cases, wireless providers may have little incentive to expand network coverage due to low population densities, lack of a dependable electrical supply, or tenuous security situations. Potential revenue in such areas is limited, and capital and operational costs are high. To improve coverage to these areas, government action may be needed.

Even if a large share of the population has mobile connectivity, a digital-payment infrastructure is vital to support digital finance. This consists of several elements. First, a robust digital-payment "backbone" that connects banks, telecoms companies, and other players is needed to clear and settle payment transactions. The payment systems should feature interoperability, the flexibility to support tiered KYC requirements, and the immediate transfer of funds. Interoperability allows end-users dealing with one payments

provider to transact with end-users dealing with a different provider. Such a system must strike a balance between supporting secure, low-cost transactions and leaving space for financial-services providers to innovate. While national-level payment systems operate in many emerging economies today, these are often inefficient and high-cost, and they connect only limited numbers of users.

Many developing countries' national payment systems, if they have them at all, have been in place for decades, and mix paper and digital processes, and card and non-card systems. These legacy systems were designed for large transactions, rather than the frequent small payments prevalent in the developing world today. Many systems have relatively restrictive rules about which providers can connect, sometimes restricting participants to selected banks, thereby holding back innovation. Fortunately, there has been recent momentum in the development of new and revamped national-level payment systems. In Peru, for example, 32 financial institutions have formed Peru Digital Payments and recently launched Bim, an interoperable mobile payment platform that works with feature phones as well as smartphones. Three major telecoms operators as well as large retailers have joined the scheme (Better than Cash Alliance, 2018).

A wide network of cash-in, cash-out (CICO) points is needed to give people access to cash when they need it. These CICO networks are inadequate in most developing countries today, where sparse traditional bank branch infrastructure is sometimes the only choice on offer. More lightly regulated banking agents—independent contractors who handle deposits and withdrawals where there are no bank branches—are almost certainly the answer, providing a much less costly way for people to access cash. They already are common throughout the Global South, from Brazil and Mali to India and the Philippines. Penetration of traditional CICO points in developing countries today is low—approximately 50 bank branches and ATMs per 100,000 adult residents compared with 140 in developed nations. Moreover, the cost of further building and maintaining this traditional CICO network is prohibitive in countries where balances and transactions tend to be small—research suggests branch and ATM CICO cost an estimated USD 5.30 and USD 1.50 per transaction, respectively, in both advanced and emerging economies (Voorhies et al., 2013).

Agent networks can reduce costs and, correspondingly increase reach. These merchants already have a customer base, possess valuable local knowledge, and are eager to build their businesses. Governments can encourage emergence of such merchant-located agent networks. And financial-service providers can consider partnerships with large retailers and various forms of retail networks to support the rapid growth of such as network.

Countries also need widespread POS terminals that accept digital payments, so that customers can replace cash purchases with digital ones. These terminals cost money to purchase and maintain and merchants typically pay a fee for every card payment they accept. For many merchants in the developing world the economic equation did not add

up. Achieving widespread acceptance of digital payments in the developing world will thus require proliferation of new technologies and new service models (World Bank, 2016). New technologies leveraging merchants' widespread ownership of phones can lower the cost and increase the convenience of accepting digital payments. At the most basic level, mobile-money services such as M-Pesa make it possible for merchants to accept payment by text.

For smartphones, the emergence of mobile point-of-sale (mPOS) technologies allows merchants to link phones to card and contactless readers at costs below those of traditional POS terminals. In India, for example, merchants can purchase an Ezetap mobile phone card reader for around USD 50. Other technologies may take off in certain locations—Chinese regulators have approved payments via QR codes, which allow smartphone cameras to create and scan barcodes. Ultimately, the infrastructure needed will be determined by the products that eventually dominate the market.

The third prerequisite for safe digital financial transactions is a widely accepted system of personal IDs. People cannot use formal financial services without some form of identification that enables providers to verify their identity and thereby minimize fraud and satisfy KYC regulations. Yet one in five individuals in emerging economies today remains unregistered in their country, compared with one in ten in advanced economies (World Bank, 2016). Even when people have an ID, they cannot register remotely for financial products if that ID cannot be authenticated online or through another digital mechanism. Having a national ID system, whether public or private, and digital authentication are thus essential for enabling digital finance to take off. As noted, there are some risks in these systems that need to be mitigated, especially cybersecurity, centralization of data ownership, surveillance and privacy, and potential misuse of data. Nonetheless, digital identification schemes create wide variety of benefits by facilitating many different interactions between individuals and institutions, creating value for both sides. Individuals use ID as consumers, workers, micro-enterprises, taxpayers and beneficiaries, residents, and asset owners, to interact with firms, governments and other individuals. Institutions use an individual's ID as commercial providers of goods and services, employers, public providers of goods and services, governments, and asset registers.

Financial-services providers and customers both gain when their country has universally accepted forms of identity. Providers can design simpler, standardized verification processes and better control fraud. Customers can be confident that a single form of identification will work whenever and with whomever they transact.

More than 45 countries have rolled out national digital identification system and the topic is on the agenda in many places; several African nations convene an annual conference called ID4Africa, a regional collaboration of governments, development agencies, and the private sector that discusses ID ecosystems across the continent. However, most of these efforts are in early stages of development, limited to specific applications, such as for government benefits or financial transactions, and have yet to achieve significant,

broad scale. Most offer only basic ID verification, not the full spectrum of personalization. In Mexico, which does not have a national ID program, the voter ID card has emerged as the primary source of identification. This poses difficulties particularly around elections when there are restrictions on signing up for or renewing cards. In Nigeria a patchwork of public and private ID systems has emerged, and the government has spent more than USD 2 billion over a ten-year period on disparate ID programmes. Despite this, no universal programme has developed (Gelb and Diofasi, 2016).

As the cost of microchip and biometric technology declines, developing countries are increasingly able to implement digital ID programmes. India's Aadhaar biometric ID programme is one instance of success. Just over USD 1 billion has been spent since 2010, and more than one billion people, including nearly the entire adult population, have been signed up by 2016. While many governments say they support digital IDs, not all have made their development a priority, sometimes because of privacy concerns. Launching a national digital ID is challenging: it requires significant coordination among public- and private-sector institutions to understand each other's requirements and ensure that the ID is affordable and easy to register for. A huge IT, logistical, and marketing effort is essential to launch and encourage high take-up. Given the complexity of such an undertaking, governments need to provide committed leadership and funding.

Beyond the mechanics of a strong digital infrastructure, countries also need a sustainable, competitive business environment that can support a broad range of participants in digital finance. This can include not only banks, but also telecoms companies, mobile handset manufacturers, FinTech start-ups, and other businesses such as those in retail. Two aspects are important: implementing risk-proportionate regulation that promotes a stable financial system in which the interests of providers and users are aligned and fostering innovation and competition.

Creating a dynamic market that is sustainable through banking and business cycles requires enacting financial regulation that carefully balances the need to protect the interests of investors, consumers, and governments, and giving financial-services providers sufficient space for innovation and competition. That means ensuring the stability of the financial system, including with prudential regulation such as minimum capital ratios that aims to align the interests of financial-services providers with those of the financial system.

Bad loans and operational mishaps are the two main sources of losses for providers of digital financial services. Bad loans are part of doing business for any lender but can contribute to financial instability in an economy. Conversely, excessively tight credit standards can hamper financial growth. Types of operational risk that are particularly relevant to digital financial services include fraud, cyber risk, and other systemic IT failures. No one is immune. For example, in February 2016 hackers succeeded in withdrawing USD 101 million from Bangladesh Bank's account with the Federal Reserve Bank of New York (Al-Mahmood, 2016).

Protecting customer interests is also essential. Regulation needs to ensure that financial services providers protect consumers, particularly those who are most vulnerable and least economically valuable to the provider. Such regulation should attempt to promote transparent information about products and services (including, for instance, information about up-front fees) and responsible practices so that customers are treated fairly. While digital technologies open the door for many more people to be financially included for the first time, it is essential to avoid "digital loan sharks" and other providers that may seek to profit from these potential customers' lack of experience. In China, for example, a study by Tencent and the China Academy of Information and Communications Technology found that the amount of money obtained fraudulently through digital finance rose by 17 percent in the second quarter of 2018 even though the actual number of fraudulent activities decreased by 26.6 percent. The target of digital financial fraud is becoming younger, with people from 18 to 35 accounting for 71 percent, the study found. Men are twice as likely to be defrauded as women China Daily, 2018).

Finally, regulators need to promote fair competition. If regulation is overly burdensome, providers will cease to innovate or compete for customers and everyone will be worse off. Regulations needs to be proportionate to risk, but not more stringent—whether in the case of tiered KYC rules allowing lower identification requirements for smaller accounts, or the granting of e-money licenses to encourage non-bank companies to provide basic financial products in a regulated environment without requiring a full banking license. Competition is strongest when all providers are treated as equally as possible by regulation. Regulators may choose to intervene if different types of players received different treatment without clear commercial justification. For example, in Mexico the government regulator mandated in 2014 that there must be no more than a 5 percent difference in prices charged to different providers to use payments clearinghouses (Banco de México, 2014).

China is a special case with a heavily regulated banking sector and a more loosely regulated non- bank financial sector. Chinese banks have responded by focusing their lending on larger, frequently state-owned businesses, resulting in a majority MSMEs being significantly underserved. In response, a thriving sector of FinTech companies and other non-bank financial institutions have proliferated to provide new payment, lending, and credit products to individuals and MSMEs. Three Internet giants—Baidu, Alibaba, and Tencent—have released digital financial-services products. For instance, 400 million users of Tencent's online social WeChat platform have either linked a bank card to their accounts or maintained a positive account balance in the past three years. Alibaba's affiliate Ant Financial can now create credit scores for small businesses based on using online information; it has loaned more than USD 1 billion to 6 million MSMEs in China, or half of all small businesses (SME Finance Forum, 2018).

6. Concluding Remarks

Wide-ranging digital financial services can usher in an era of higher-quality, more efficient service delivery. They can provide significant new markets and a much larger customer base for many types of providers, including financial institutions and telecoms companies but also e-commerce retailers and other participants in the digital economy. Best of all, they can open a new world of economic opportunity for as many as two billion people and hundreds of millions of businesses currently shut out of their countries' financial systems. In the process, this will stimulate economic growth and job creation, and potentially stimulate increased financial flows among developing economies as modern technology combines with modern finance.

For South-South cooperation, too, digital finance is a potentially key enabler of greater financial flows and other cross-border transactions. Remittances have led the way, but as digital financial infrastructure is built out, many other services will become possible or easier, from e-commerce to larger-scale investment. Agencies including the UN Office for South-South Cooperation have a constructive and important role to play here, in encouraging and facilitating the build-out of infrastructure, in helping to share best practice around regulation and fraud prevention, and in ensuring that a range of stakeholders including policy makers, financial services organizations, aid groups, and donors focus on the advantages that digital finance can deliver even as they help mitigate the risks.

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CHAPTER VI

A People-Oriented Smart Society

6.1. The Emergence of an Information Smart Society

At present, ubiquitous digital technology products and services and emerging digital communities, digital cities, digital earth and other digital waves are ushering human society from an industrialized society into an information society and a smart society. It can be said that human society is becoming a digital-technology-driven, people-oriented smart society. If the main activities of human beings in the physical world are divided into economic activities and social activities, then the two main activities in the digital world correspondingly construct the digital economy and digital society. Digital technology mainly involves the industrialization of the new generation of digital technology, the digitalization of traditional industries, the modernization of information infrastructure, and the intellectualization of economic activities. The digital economy is therefore characterized by digitalization, platform-based development, individualization and customization.[68]

The application of digital technology in the social field, as in social services, social governance, and social contacts, has built a digital society, and with the combination and integration of digital technology and intelligent technology, it has gradually moved toward a smart society. Smart society, as the future development direction of human society, mainly involves three fields: the intellectualization of social governance, the intellectualization of social service and the intellectualization of social communication. Digital society is also characterized by digitalization, sociality[69], shared interests and intelligence. Compared with the digital economy, building a digital society needs to consider the subjective factors of human beings, which are influenced by personal feelings and opinions and the complex factors of human social relations. Therefore, given these influences of personal feelings and opinions, such as society also needs to apply digital technology and intelligent technology strategically and intelligently.

Smart society is ubiquitous and represents a transformative intellectualized upgrading of human society, which will reshape human life, social relations, and social governance. As another all-around and systematic change taking place in human society, the challenges that the smart society is about to bring to fruition are also historic. Its construction is closely related not only to the well-being of the people's livelihood, but also to global

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68 For platform-based development and customization, please refer to Chapter 2, «Platform Economy".

69 Sociality in this chapter mainly includes such characteristics as altruism, collaboration, dependence, and higher self-consciousness.

economic growth and social development. If developing countries fail to catch up with digital technology, some countries of the Global South will be excluded from the gates of the smart society, as Northern countries proceed to enter. While most social activities and social services in the Northern countries are carried out online, in social and intelligent forms, most social activities and social services in countries of the Global South are still offline and non-smart. In 2016, 82 percent of population in developed nations were Internet users, as compared to only 14 percent of the population in the least-developed countries.

In the process of building a smart society, digital technology drives the intelligent transformation of society. First, digital technology spurs the intelligent transformation of social services such as education and health care, which provides people with greater and fairer access to social services. Second, digital technology leads to revolutionary changes in the form of people's social activities. Virtual communities, real-time online social groups, and timely and multi-participant communication provide people with faster, more direct and more convenient communication services. Third, digital technology has also innovated government and community services such as smart traffic management, housing, leasing, etc., thus enabling the government and service providers to provide more diversified and convenient personalized social services.

The smart society driven by digital technology is opening a new chapter for the well-being of humanity. It is necessary to strengthen South-South cooperation in the field of digital technology and smart society construction among the Southern countries in accordance with the concept of "no one left behind" in the United Nations 2030 Agenda for Sustainable Development, and to open the door of smart society for the vast number of developing countries.

6.2. Smart Society and Sustainable Development Goals

6.2.1. What is a Smart Society?

The concept of smart society can be defined from many perspectives. Among them, Information City, Smart City, Digital City, Cognitive Smart City and U-city are all relevant, yet with different emphases. For example, the Smart City concept generally refers to the safe, secure, environmental and efficient urban centre of the future with advanced infrastructures such as sensors, electronic devices and networks to stimulate sustainable economic growth and a high quality of life (Caragliu et al., 2011). Digital City focuses on digitalization and visualization of cities. By means of computer and multimedia technology, countless elements in a city can be represented in digital form, while smart cities put more emphasis on increasing the level of intelligence of urban management and decision-making through information science and technology (Schaffers et al., 2011). The positive

impacts of smart cities include high resource utilization, high productivity, improved management transparency, improved quality of life, increased liquidity, and reduced service costs. The negative impacts include privacy problems caused by regulation, the collapse of large-scale energy systems that may lead to paralysis of urban systems, and public service risks caused by large-scale urban cyberattacks (Schwab, 2017). [70]

Although there is no unified definition of a smart city and the recognition of smart society has just begun, this report tentatively defines smart society as social services, social governance and social interaction driven by digital technology and intelligent technology, which are digitalized, networked, smart and intellectualized. The construction of a smart society greatly depends on the development of digital technology and intelligent technology. First, the invention and creation of single, special digital and intelligent technology is the premise of the construction of smart society; second, the combination or integrated application of similar digital technologies and intelligent technologies promotes the digitalized, intelligent and smart development of services in a certain field; third, the comprehensive application of services in many fields forms a smart city and a smart society.

The development process of smart society is divided into three phases, as shown in Figure 1. In Phase I, the invention and creation of face recognition, mobile payment and other special technologies provide breakthrough support for single technologies in the smart society. In Phase II, the combination and integration of similar technologies are applied to a certain field, which promotes the intellectualization of this field. For example, face recognition, machine learning and other artificial intelligence technologies are widely used in the field of intelligent transportation, forming smart transportation. In Phase III, the integrated application of smart transportation, smart education and health services, intelligent disaster emergency services, and social services and social governance such as smart government will gradually form smart communities, smart cities, and even smart societies.

	Phase I	Phase II	Phase III
Typical Concepts	Face Recognition, Mobile Payment	Internet of Things, Artificial Intelligence	Smart City, Smart Society
Conceptual Essence	Single and Special Technology	Similar Technology Set	Integrated and Comprehensive Application

70 Bill Hillier, Research Professor at The Bartlett School of Architecture's Faculty of the Built Environment at UCL defines cities as socio-physical systems. In the physical sense, they are very large collections of buildings and physical infrastructure held together by a complex network of space. In reality, cities are even more complex networks of activity, movement and interaction, driven by human behavior O2 2018. The Value of 5G for Cities and Communities. O2 by Juniper Research.

Causes	Competition, Innovation Interest	Market, Competition	Government, Market, Society
Motivations	Experts, Entrepreneurship	Big Business Groups	Sociopolitical Forces, Big Business Groups
Influences	Small Technology Scope	Industry and Industry Extension Scope	Vast, Society-Wide

Figure 1: From Digital Technology and Intelligent Technology to Smart Society
Source: Classified, by author.

As indicated in Figure 1, the technology of a smart society is the foundation for building a smart society. In addition to the need for general information technology, big data, artificial intelligence, mobile Internet, cloud computing, Internet of Things, blockchains, etc. are popular supporting technologies for building the current smart society. These technologies have also spawned new interrelated concepts, such as the industrial Internet of Things, energy Internet of Things, space Internet, digital Internet, Internet of Vehicles, software definition network, content distribution network, signal-processing platform, urban operating systems, urban brain, fog computing, small data, software enabling, light intelligence technology, 5G, and so on. By way of example, 5G connectivity will enable the widescale adoption of high-quality telehealth video conferencing, allowing people to conduct GP consultations on their smartphones or devices. It will also provide the reliable and secure connectivity that will enable the widescale adoption of digital health monitoring devices (O2, 2018).

The scenarios for a smart society should cover a wide range of fields, which are composed of smart and smart application scenarios in different fields. They can be roughly divided into three areas: smart social governance, smart social services, and smart social interaction, as indicated in Figure 2.

Smart social governance refers to the realization of full and equal social participation and social management through the support of intelligent science and technology, making decision-making more transparent and democratic. At present, the most widely used application on a global scale can be seen in the development of e-government. The application scenarios for smart social services include education, medical care, health, public safety, urban management, planning management, resources and environment, disaster prevention and mitigation, etc. Its purpose is to benefit everyone, make social services more pro-poor, more inclusive and not leave one person behind. Smart social interaction is mainly supported by smart social apps, such as Facebook and WeChat, which makes social interaction more convenient, more intelligent and smarter.

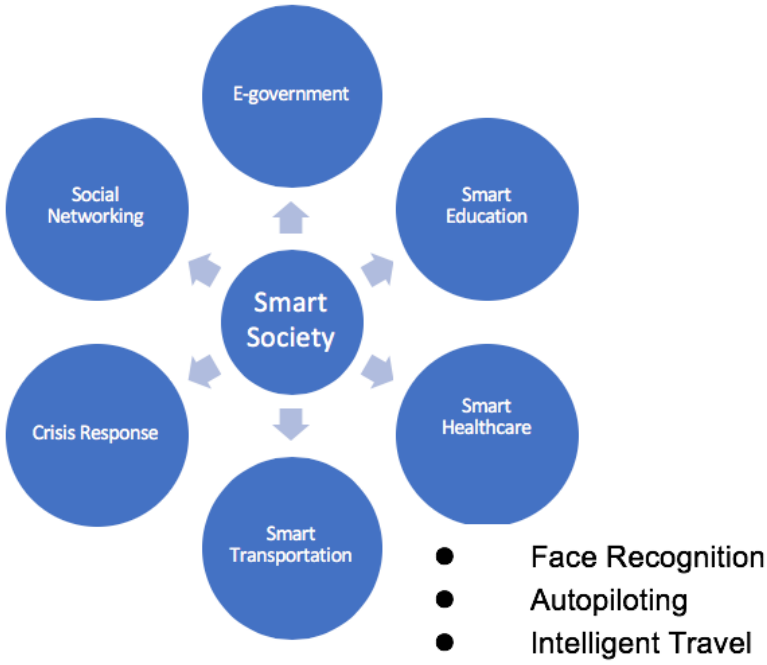

Figure 2 Smart Society Scenarios
Source: Author, January 2019.

The priority application scenario of a smart society should adhere to the principle of "people-oriented". First, through the support of intelligent technology, these technological applications can be seen as meeting people's basic needs in food, clothing, housing and transportation, as is the case with Airbnb and Meituan-Dianping[71]; second, through the support of intelligent technology, they can meet people's development needs in education, health and social protection, as with eHealth, MOOCs (a massive open online course), and so on. Third, through the support of intelligent technology, they can meet people's higher needs in social interaction, social equality and social participation, such as online public opinion surveys, online participatory decision-making in public affairs, etc.

6.2.2 Smart Society and Sustainable Development Goals

The construction of a smart society is a digital ladder for human beings to achieve the social development goals set in the Sustainable Development Goals in 2030. With the increase of urbanization, cities have become the main gathering places for human beings. The urban population of the world has grown rapidly from 751 million in 1950 to 4.2 billion in 2018 (UNDESA, 2018). In 2008, the global urban population surpassed the rural population

71 Meituan-Dianping is a Chinese group buying website for locally established food delivery services, consumer products and retail services. It is also one the world›s largest online and On-demand delivery platforms. It has over 290 million monthly active users and 600 million registered users as of April 2018 (Windsor, 2018).

for the first time. Worldwide, more people now live in urban areas than in rural areas, with 55 percent of the world's population residing in urban areas in 2018. It is expected that by 2050, the proportion of the world's urban population in the total population will exceed two-thirds, and the figures for Asia and Africa will even be higher (UN, 2018). Extreme poverty is often concentrated in urban spaces, and national and city governments struggle to accommodate the rising population in these areas. In cities, the conflict between the growing population and the lack of land, water, energy and other resources is prominent. Making cities safe and sustainable means ensuring access to safe and affordable housing, and upgrading slum settlements (UNDP, 2019). It is estimated that approximately one quarter of the world's urban population lives in slums, and that figure is rising fast. The number of slum dwellers in developing countries increased from 689 million in 1990 to 880 million in 2014, according to the United Nations World Cities Report 2016. Urban management is often chaotic in developing countries, especially in Latin America, South Asia, and other countries. As the urban population keeps expanding, development dilemmas of intensifying contradictions in urban development, urban management and development are presenting enormous challenges. Therefore, urban development requires more smart social management and services.

In response to the problems and challenges posed by urbanization, the United Nations Sustainable Development Goal 11 has been defined as "Sustainable Cities and Communities", i.e., the establishment of cities and communities with sustainable development capabilities. Its specific objectives include strengthening inclusive and sustainable urbanization in all countries by 2030, improving the capacity of urban management and reducing the destruction of cities caused by natural disasters, establishing space for women and children's development and improving urban traffic management ability, etc. (UN, 2018). The emergence and development of smart society, as in the cases of e-government, distance education, medical treatment, public safety, urban management, disaster prevention and mitigation, provide unprecedented opportunities for the realization of this goal.

In the vast rural areas, the social infrastructure is weak, the distribution of public resources, such as health care and education, is uneven, and the poor cannot enjoy basic social goods and services. In such areas, agricultural production technology is not advanced, and the agricultural extension system is flawed; farmers cannot get effective technical support, and the overall output rate for agricultural products therefore continues to be low. Hunger and undernutrition continue to be pressing realities in dozens of countries. Forty-five countries out of the 119 countries that were ranked have serious levels of hunger (Greber et al., 2018). In addition, due to a lack of awareness regarding sustainable development, farmers develop natural resources in a disorder manner, the state fails to provide oversight, wildlife decreases greatly, and vegetation is seriously damaged. In Somalia, for example, the Shebel River is drying up and is gradually unable to meet the needs of agricultural production along the river (Ekekwe, 2017). Especially in recent years, given the influence of climate change, the uncertainty of agricultural production has increased, and the perpetuation of hunger still remains a serious problem (Ekekwe, 2017). The development of digital technology will resole this problem. Smart society will first take place in rural areas to improve the management and utilization of agricultural resources, promote

sustainable resource utilization, and strengthen resilience to disaster and risk. For example, Ujuzikilimo, a Kenyan start-up, uses large data analysis capabilities to transform agricultural production units into a knowledge-based community. Its goal is to improve productivity by managing daily irrigation and fertilization through digital decision-making systems. Sun Culture, which sells drip-irrigation kits, uses solar pumping to reduce irrigation costs (Ekekwe, 2017).[72] Furthermore, the smart society in rural areas will provide opportunities for universal access to social services such as education and health. Table 6-1 lists the key problems of social development and solutions for a smart society. In short, the development of digital society in rural areas is related to many goals of sustainable development of the United Nations.

Table 6-1 Social Development Problems and Smart City Solutions

Areas of Smart Society	Social Development Issues	Digital Technology Solutions	Advantages
Intelligent social governance	Weak executive ability of government planning, chaotic management, non-transparent information	E-government system	Transparent, efficient, and quick information Online public services
	Chaotic traffic management, development disorder, and congestion	Intelligent Transportation Management Platform	Integrated and visual management Intelligent travel, parking, etc.
	Pollution discharge, extensive energy management, serious waste of energies	Smart energy management system	Supervises and controls pollution discharge, waste management and achieves intelligent energy consumption management
	Many loopholes in public safety management, especially in slums, violence, drug abuse, conflict, etc.	Intelligent public safety management system	Grid community management
	Weak disaster early warning and response abilities	Disaster detection and early warning system Disaster assessment and rapid response Intelligent decision-making and search and rescue	Improves risk assessment ability Improves disaster response efficiency

72 Sun Culture Kenya Ltd is a Kenya based company that distributes solar irrigation kits to local farmers could transform agriculture through solar powered irrigation – a cost-effective solution to low rainfall and spiking energy prices. For more details, see http://sunculture.com/.

Smart social services	Uneven distribution of quality education resources	Distance education and MOOCs	Resource sharing and reduced inequality
	Uneven distribution of doctor and hospital resources, weak ability of community medical service	Distance medical care, Smart medical care	Resources sharing, reduced inequality Personalized service
	Incomplete social security network and low popularization rate of employment, social security and other basic services	Big data social security platform Big data employment service platform	Accurately identify social security objects Accurately match employment information
Smart social interaction	Information blockade, social isolation, social exclusion, less social activity	Big data, social software, such as Wechat, Facebook	Instant, multimedia, peer-to-peer, multi-party, community

Source: Author, January 2019.

6.3. Smart Social Governance

6.3.1. Smart City and Traffic Management

With the rise in urbanization, urban traffic management has become an important application area for the smart city. Traffic congestion has plagued most cities of the world to varying degrees, and therefore the application of intelligent technology in urban traffic management is seen as urgent. Even in highly developed countries such as the United States, there is a great demand for more smart traffic management. This same situation also exists in developing countries. According to the U.S. Department of Transportation, traffic safety, congestion and environmental pollution are the three major traffic problems facing cities (Leonard, 2017).

Traffic safety is the first challenge facing urban traffic management. In the United States, 35,092 people died in highway accidents in 2015 (NHTSA, 2016). In developing countries, due to people's poor awareness of traffic rules and poor traffic management capacity, traffic accidents lead to a higher number of deaths. Major cities in India have been listed as one of the most crowded places in the world. In Delhi, it is estimated that traffic congestion caused by fuel waste, declining productivity, air pollution and accidents will cost the city USD 9.6 billion a year (approximately 12% of GDP) (Chin et al., 2018). Delhi and Mumbai are two major urban centres in India with relatively developed modern public transport systems. However, with the rapid growth of population and the growing prosperity of these two markets, dependence on automobiles is expected to increase, which will in turn put more pressure on the road network (Chin et al., 2018). Most of cities in developing

countries will therefore have a tremendous demand potential for smart urban traffic management.

The mobility problem caused by traffic congestion is the second biggest challenge facing urban traffic management. In 2014, traffic congestion led to an additional 6.9 billion hours of travel and 3.1 billion gallons of fuel purchased by urban residents in the United States (Schrank et al., 2015). Vehicle exhaust emissions are the third major challenge facing urban traffic management. Beijing is plagued with serious urban traffic congestion, which has a great impact on the air quality in that city. Since 2015, the Chinese government has increased the monitoring of vehicle emission pollution in Beijing and in surrounding cities and has adopted many restrictive measures. These include emergency response plans to be carried out by local governments during periods of heavy pollution, which include restricting traffic and limiting emissions from industry; strict controls for heavily polluting industries that are looking to expand; and ensuring that construction projects pass environmental evaluations before they are given permission to go ahead.

In recent years, the emergence of digital technologies such as the Internet of Vehicles (IoVs), Internet of Things, artificial intelligence and big data has brought unprecedented prospects and business opportunities for solving the above three major problems facing urban traffic. With the improvement of the level of smart transportation, areas ranging from Connected Vehicles to Internet of Vehicles will be an important development field of smart city and transportation in the future. Internet of Vehicles is the integration of three networks: intra-vehicle network, workshop network, and mobile Internet of vehicles. Based on the concept of integrating three networks into one, we define the Internet of Vehicles as a large-scale distributed system for wireless communication and information exchange between vehicles (APEC, 2014). Internet of Vehicles can bring obvious advantages, reduce the number of vehicles on the road by reducing the no-load rate, and bring a lot of energy savings and traffic congestion alleviation. Even the emergence of online car booking platforms alone has played a positive role in improving the inefficiency and congestion of urban traffic. For example, Uber, Taxify and DiDi[73], which are widely used in cities of developed and developing countries, provide more intelligent platforms that effectively connect drivers and passengers, thereby improving travel efficiency. DiDi partners with Grab, Lyft, Ola, 99, Taxify and Careem in a global ride-hailing network that reaches over 80% of the world's population across over 1,000 cities. Currently, DiDi provides ride-hailing services in Brazil under the 99 brand and operates DiDi-branded mobility services in Mexico and Australia, while also providing taxi-hailing service in Japan through a joint venture. By continuously improving user experience and creating social value, DiDi strives

73 Didi Chuxing (DiDi) is the world's leading mobile transportation platform. The company offers a full range of app-based transportation options for 550 million users, including Taxi, Express, Premier, Luxe, Bus, Designated Driving, Enterprise Solutions, Bike Sharing, E-bike Sharing, Car Sharing and food delivery. Over 31 million drivers have found flexible work and income opportunities on the DiDi platform. For more details, see https:www.didiglobal.com

to build a safe, open and sustainable mobile transportation ecosystem[74]. In South Africa, WhereIsMyTransport (WIMT), a mobile application launched in 2014, is a platform that integrates information such as fares, frequencies and routes from informal modes of transport to conventional modes of transport, such as rapid transit, public transport and railways. This smartphone-based online car booking service platform provides convenient services for South African citizens to travel.

Intelligent Transportation Systems (Greber et al.) represent a typical application in many countries and cities that promotes the integration of Internet, intelligent technology and transportation services. The Chinese government has formulated plans to build a "smooth travel in China" information service, forming a comprehensive travel information service platform covering transportation, parking, leasing, repair, rescue, derivative services and other fields, so as to realize full-range, real-time and diversified information inquiry, release, and feedback. China is promoting the rapid development of "one-stop" ticket payment applications, which can meet a range of customer needs, such as booking, payment, ticket checking, entrance and exit of stations, and modifying itineraries through mobile applications (State Council, 2017). In India, in order to solve the traffic problems caused by urbanization, information technology is rapidly applied to traffic management and services, and intelligent transportation systems composed of mobile apps, sensors, Global Positioning System (GPS), cameras, cloud computing and other information technologies are attracting much attention. Announcing that India will seek to apply intelligent traffic system on all highways, Union Minister Nitin Gadkari has urged automobile makers to find solutions for public transportation and vehicles using alternative fuels so as to curb pollution (Gadkari, 2018).

6.3.2. Areas of Public Safety, Emergency Response, Disaster Prevention and Relief

In addition to urban transportation, another important area of smart society involves public safety, emergency response, disaster prevention, and risk treatments. Due to the influence of climate warming, global natural disasters are now occurring with greater frequences, causing catastrophic damage for the people and economies in developing countries. According to statistics from UNDESA (2018), since 1970, the number of disasters worldwide has increased by more than two-fold. These disasters are also marked by greater abruptness and a broader range of impacts. Despite the decline in the number of disasters from 2006 to 2016, the resulting casualties and economic losses have continued to rise. Asia is the region with the highest incidence of natural disasters and human injuries. From this we can see that strengthening the response capacity of disaster prevention and mitigation is an important means to achieve the Sustainable Development Goals by 2030.

Digital technology plays an important role in increasing the flexibility of government in dealing with such risks, and it plays an irreplaceable role in disaster prevention, mitigation,

74 Same as above.

relief, preparedness, and recovery periods. Digital technology, including information communication, satellite remote sensing and other technologies, can enhance disaster early warning capabilities. It can accurately identify, locate and deploy the location and level of disasters ahead, rationally allocate resources when disasters occur, greatly help in evacuation, and assist in the deployment of personnel and materials. In recent years, with the promotion of big data, Internet of Things, cloud computing, UAV and robots, the accuracy and corresponding ability of disaster response have significantly improved. For example, the tsunami early warning system in Chile is to install a pressure sensor network near the main fault line of the Peru-Chile trench, detect and predict earthquakes by sensors, and transmit it to the national control centre after high-risk early warning is issued (UNDESA, 2018).

The United Nations Educational, Scientific and Cultural Organization (UNESCO), the Intergovernmental Oceanographic Commission (IOC), in tandem with the State Oceanographic Administration of China, launched the South China Sea Tsunami Advisory Centre, which began operation in January 2018. This centre aims to provide all-weather tsunami monitoring and warning services for China, Brunei, Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Thailand, Vietnam, and the Hong Kong and Macau Special Administrative Regions of China (UNDESA, 2018). This is a trilateral cooperation between the Chinese government and other countries under the auspices of UNESCO. Tsunami early warning in South China is also an important part of the global tsunami early warning system. South China Sea Tsunami Advisory Center has a new-generation intelligent human-computer interaction platform for tsunami monitoring and early warning, which integrates 12 subsystems, including global Haiti earthquake monitoring, global water level monitoring, Pacific tsunami parallel prediction models, tsunami scenario database and tsunami product production and release. Its effectiveness in tsunami warning time is approximately 8-10 minutes, reaching the international advanced level; while three years ago, the figure was still in the 20-30-minute range (Liu (刘诗瑶), 2018).

Sri Lanka's Sahana (In Sinhalese, "Sahana" means "relief") was founded after the tsunami affecting several Asian countries along the Indian Ocean occurred on December 26, 2004. The Sahana Software Foundation is committed to the mission of saving lives by providing information management solutions to enable relevant institutions and communities to better prepare for and respond to disasters. Sahana develops free and open-source software and provides services to help solve specific problems and improve the efficiency of disaster response coordination among governments, aid organizations, civil societies, and impacted populations. Sri Lanka's ICT industry created this initiative to help track family information and coordinate work among relief organizations. Sahana is a free open-source software consisting of a series of integrated network-based disaster management applications. [75] It automatically collates, summarizes and calculates data, and provides

75 For more details, see https://sahanafoundation.org/.

real-time information and needs assessment. By promoting information sharing and coordinating the work of various organizations and individuals, Sahana has filled a gap in the toolbox of emergency and disaster response agencies.[76]

6.4. Intelligent Social Services

In the framework of smart society, the intelligent implementation of social services is the second largest field after smart social governance. The E-Government Development Index is a good tool to evaluate the level of a country's smart social development.[77] The rapid development and wide application of e-government helps build a flexible society and improves social governance and social services. The process of introducing e-government in developing countries has been relatively slow. Since 2001, the United Nations has assessed the e-government initiatives of 193-member states. The results show that e-government has achieved rapid development in the past 17 years. The number of very high-level e-government countries has increased from 10 in 2003 to 40 in 2018, however growth has lagged in Africa. Europe continues to lead e-government development by the highest EGDI (0.7730), followed by the Americas (0.5900), Asia (0,5780), Oceania (0.4610), and Africa (0.3420), respectively. According to the 2018 E-Government Development Index (EGDI), Denmark, Australia and South Korea rank the top three in terms of providing government-related services and information via the Internet (UNDESA, 2018). The top 10 countries also include Britain, Sweden, Finland, Singapore, New Zealand, France, and Japan. European countries are leading the way in e-government development, while the Americas and Asia share almost equally in the high and middle EGDI levels. In the higher EGDI range, the number of African countries is only six.[78] After 2016, only Ghana has risen to the high EGDI level (UNDESA, 2018). The Ghana government attaches great importance to its ICT development. Ghana Shared Growth and Development Agenda (Ghana 2017-2017) states that Ghana will increase the use of ICT in all sectors of the economy, including e-government, and carry out relevant projects through the National Information Technology Agency and the Ghana Electronic Communications Investment Fund to implement the national electronic security system and promote other ICT-related mechanisms in the public interest (COP, 2012). Ghana's successful practice of promoting the development of e-government is a good model for other African countries to follow so that they can accelerate the Intelligent Social Services and Smart Education.

Digital technology has been widely used in education. Distance and network education are providing powerful technical support to improve education services in underdeveloped

76 For more details, see https://sahanafoundation.org/.
77 For how to investigate and calculate the E-Government Development Index, please see UN(2018)
78 The six Africa countries with high EGDI includes Mauritius (0.6678), South Africa (0.6618), Tunisia (0.6254), Seychelles (0.6163), Ghana (0.5390) and Morocco (0.5214) (UN, 2018).

areas, with the ultimate aim of providing equitable and universal access to education services. The wide application of AI in the field of education will also have a revolutionary impact on education. Classroom-centred traditional education is being replaced by technology-driven digital education, indicating that education will be more people-oriented and smart. First of all, AI can have a transformative impact on the roles of students and teachers, with the classroom no longer following a teacher-centred model, but a more interactive, participatory and open teaching method. Second, AI breaks through the time and space constraints of classroom education, allowing students to learn anywhere and anytime. For example, MOOCs[79] and Khan Academy[80] have led to rapid growth in the field of learning analysis (Stone, et al., 2016). Third, AI can provide customized education and relevant courses based on the learning content required by students; it can break the division of disciplines and grades; and primary school students can also learn secondary school subjects according to their interests and abilities. Similarly, secondary school students can also review the primary school curriculum, thus breaking the hierarchical grade divisions of traditional education. AI can also provide personalized education, in the form of tutors (e.g., AI Tutor), which can automatically provide assessment and analyze errors, while also reinforcing positive study habits. Finally, assisted by intelligent technology, teachers can have more time for innovative education and improve the quality of education.

ELearn Africa is Africa's largest online education platform. Since its inception, over the past 13 years, it has received 17,278 users from more than 100 countries in the world, more than 80% of whom come from the African continent (eLearning Afirca, 2018). The representatives of eLearn Africa have become senior decision makers and practitioners in three key areas that drive e-learning applications and innovation: education, business, and government.[81] In 2017, the Association of African Universities (AAU) and eLearn Africa signed a landmark agreement under which 10 million students will be able to receive higher education through online services at the AAU member schools (Etherington, 2017). The AAU members will provide education to students in more areas, including rural areas[82], by providing online and distance learning. The platform will also support the development and deployment of online educational resources in universities and the use of eLearn Africa learning management system. The AAU is the largest higher education coordinating body in Africa, and its members are recognized and prestigious institutions of higher education in Africa, including 380 universities in 46 African countries (Etherington, 2017). The partnership will provide its member schools with Africa's largest online teaching platform and support network.

79 See footnote 6.

80 Khan Academy offers practice exercises, instructional videos, and a personalized learning dashboard that empower learners to study at their own pace in and outside of the classroom. The online resources include math, science, computer programming, history, art history, economics, and more. All resources are available to users of the website. The website and its content are provided mainly in English, but is also available in other languages including Spanish, Portuguese, Hebrew, Italian, Russian, Chinese, Turkish, French, Bengali, Hindi, Georgian, and German. For more details, seehttps://www.khanacademy.org.

81 For more details, see https://elearning-africa.com/index.php.

82 For more details, see https://thepienews.com/news/elearnafrica-partnership-to-reach-10-million-students/

For children, all of whom were born in the Internet age, the digital divide has a far greater impact than on adults. Nearly 30% (346 million) of the world's young people (15-24 years old) have not yet used the Internet (UNICEF, 2017). This means that they have lost opportunities to learn and communicate with the outside world and are unable to adapt to the learning requirements of new skills, resulting in employment difficulties and long-term poverty (UNICEF, 2017). It can be seen that digital technology is very important to promote fair education for children, especially marginalized children. Affected by the violent conflict in the Central African Republic and Nigeria, a large number of refugees from neighboring countries flooded into Cameroon, resulting in more than 300,000 displaced people in Cameroon, of whom two-thirds were children, most of whom had never seen the Internet. UNICEF launched a Connect My School pilot project in Baigai Public School in Cameroon in 2017. By installing solar satellite equipment in schools, it can provide network connections within 500 meters of the square and distribute tablet computers suitable for children to schools (UNICEF, 2017).

The Open University of China is a new university without walls. At present, there are 3.59 million registered students, including 1.5 million undergraduate students and 2.54 million junior college students. These figures include nearly 200,000 rural students, 100,000 army sergeant students, and more than 6,000 students with disabilities. The Open University of China is committed to supporting open learning, exploring a new learning model that combines Web-based learner-centred self-learning, support services for distance learning and face-to-face tutoring. In 2017, the first Overseas Learning Centre of the Open University of China was established in Zambia. It adopts the model of "one centre with several teaching points". Headquartered in the China Economic and Trade Cooperation Zone of Zambia, its first three teaching points are located in the China Economic and Trade Cooperation Zone of Zambia, the Central African Mining Co., Ltd., and the Luansha Copper Industry Co., Ltd. Taking Zambia Copper Mine as an example, the platform teaches local workers in Zambia Copper Mine basics in Chinese-language-related knowledge by adopting online and offline teaching methods, and mainly using the textbook titled *100 Sentences of Common Industrial Chinese* for the three disciplines of Welding, Mining and Metallurgy, and Maintenance. These educational tools were jointly devised by the Open University of China and the Working Group of the Vocational Education Pilot (TCFC, 2017).

6.4.1. Smart Medical Health

Medical health is undoubtedly one of the most active areas in the smart society, especially the field of medical health promoted by digital technology such as artificial intelligence, robotics, 5G and so on. Health AI offers opportunities in a variety of therapeutic areas, including health and lifestyle management, diagnosis, wearable devices and virtual assistants. Robot-assisted surgery, virtual nursing assistant, management flow assistance, fraud detection, automatic image diagnosis, preliminary diagnosis, dosage error reduction, network security and other health artificial intelligence applications are increasing (Collier

et al., 2017). Big data and artificial intelligence will have a far-reaching impact on the modes and quality of medical and health services.

African countries continue to face serious shortcomings in health care, especially in health promotion and epidemic prevention and control, such as HIV/AIDS. In 2012, the African Development Bank launched a competition for innovative and sustainable information and communication technology initiatives in the health sector in Africa, the aim of which was to identify ICT innovative projects in the health sector in Africa. Among the 115 project proposals received, M-Health projects accounted for 48% and e-Health projects accounted for 52% (AFDB, 2014). Most of these projects are cross-regional or even transnational, 33% of which come from East Africa, 28% from West Africa, 11% from Southern Africa and 3% from North Africa (AFDB, 2014). For example, Cameroon's epidemic location and response system mainly reports and responds to meningitis, yellow fever, cholera and other epidemics by using mobile phone networks distributed at various epidemic observation points (AFDB, 2014). This indicates that the awareness of ICT technology in the field of health care has begun to germinate in Africa, but limited by human capital and infrastructure, the current e-Health system is relatively simple, mainly relying on mobile phones, computers and other tools or networks, which are used to report illnesses, epidemics or drug storage, and have not yet been used for comprehensive management of medical records or clinical diagnosis points and analysis of illness, etc.

Medical teams abroad, as one of the main forms of China's foreign aid, refer to medical staff teams dispatched to recipient countries to provide medical equipment and medicines free of charge for designated or itinerant medical services in the recipient countries (Information Office of the State Council of the People's Republic of China, 2011). China's health aid initiatives to foreign countries (CHA) began in April 1963, when the first China medical team (CMT) was invited to Algeria (Li, 2009). After the third Forum on China-Africa Cooperation (FOCAC), held in Beijing in 2006, China's health aid has been one of the most important fields for South-South cooperation between China and Africa. In July 2016, the China-Zambia Telemedicine Consultation Centre at Levy Mwanawasa Hospital in Zambia was formally established with the assistance of China. The telemedicine consultation centre links Levy Mwanawasa Hospital and the First Affiliated Hospital of Zhengzhou University in Henan Province. Both sides consult and teach through the telemedicine system, conducting realize face-to-face communication between experts and patients, and experts and experts from different places (Ministry of Commerce of the People's Republic of China, 2017). This is an exploratory initiative of South-South cooperation in healthcare between China and Africa using ICT technology. In 2017, the African Telepathological Consultation Platform built in Henan Province of China was officially put into operation in Ethiopia. This platform not only carries out online consultation, it also conducts online pathological consultation (Zhang , 2018).

Southern countries can leverage the digital technology advantages of Northern countries, and through the North-South Cooperation (NSC), the Triangle Cooperation (TrC), and avail

themselves of technology transfer, cooperation and development cooperation in South-South cooperation, as indicated in the above examples, to rapidly improve the quality of health data and the level of smart health care. Brazil and Denmark are improving the level of health data management through the North-South Cooperation. Despite the large quantities of health data generated by various health service information systems throughout Brazil, these data are affected by the structure and organization of the data and face many challenges in data exchange and sharing. The main problems include poor quality of health data, lack of international standardization, and inability of data exchange, scattered data production and high redundancy of health data, and different health billing systems. Such decentralized health information systems reflect the lack of a national health data policy historically and the inability to establish a national health data platform for collecting and sharing health data. To overcome these challenges, Brazil is seeking to restructure and strengthen the area of national health data with technical support from Denmark, thereby drawing inspiration from international models, standards and experiences and improve health care through better use of data.

6.5. Strengthening South-South Cooperation for Smart Societies

Traditional South-South cooperation has tended to focus on promoting the flow and cooperation of single elements in the fields of finance, technology, and so on. South-South cooperation in the field of smart society, based on the original cooperation, seeks to carry out cooperation within a broader scope by using digital technology, including the exchange and sharing of infrastructure, information and data, network security, knowledge, policy, and other resources.

Developing countries have advanced unevenly in the field of smart society. As the above cases indicate, China and India have accumulated some experience in related digital technologies and applications in the fields of smart society within the framework of SSC. Although other developing countries have begun to innovate in various ways, they are developing slowly, yet noteworthy examples include the innovation and exploration of smart medical care in Africa mentioned above. However, due to the high degree of technology integration involved in smart society, the development of smart society in most countries of the Global South is still lagging behind. It is difficult for most Southern countries to achieve the goal of smart society through the efforts of a single country, which provides the possibility for the South-South cooperation in the field of smart society.

6.5.1. Guidelines for South-South Cooperation in Smart Society

South-South cooperation in the field of digital society includes infrastructure, technology, data security, and policy cooperation. The construction of projects related to smart society within the framework of South-South cooperation should follow the core principles of

problem-oriented, resource-sharing and practical effects. Three principles should be put forward as indicated below:

First, as for the problem-oriented principle, because of the particularity of each place, the existing successful models cannot be completely copied. It is necessary to design practical solutions and engineering projects according to actual local needs, actual environment and technological bases, and avoid neglecting practical problems due to the blind pursuit of technological advancement.

FOCAC has been an official cooperation mechanism between China and Africa countries since 2006. FOCAC has provided a very important policy dialogue that is based on problem-oriented principles. In 2018, FOCAC released the China-Africa Cooperation Beijing Action Plan (2019-2021) (MFA, 2018). It includes cooperation in the fields of social infrastructure and digital technology, such as AI, big data, and data security, etc., for tackling problems in the fields of social development and social governance in African countries.

Second, as for the principle of resource sharing, in the smart society characterized by digital technology, data and information are not only the material forms but also the main economic resources of the digital economy. Just as natural resources are very important in agriculture and the industrial economy, data and information resources are also very important in the digital economy and smart society. It is necessary to fully exploit the increasing marginal revenue potential of electronic data and computer software in a smart society. It is relatively easy to discover waste of natural resources, but often difficult to detect the waste of data and information resources. Digital information can be characterized by its non-consumable and sharing nature. Therefore, if the data and information are not used or used only minimally, it would appear to be a waste of data and information resources, which in essence amounts to a waste of economic and social resources. Attention should be paid to the development, dissemination, sharing and service-system construction of data and information resources in the construction of a smart society. Standards for information sharing should be formulated and integration of information resources should be strengthened so as to achieve full sharing in six aspects: site, network, hardware, software, data, and human resources, so that populations can fully enjoy the information services of a smart society. Therefore, in South-South cooperation in the field of smart society, both sides need to follow the principle of resource sharing.

Third, as for the principle of practical effects, whether it is a smart society or a smart city, regardless of how either is defined or interpreted, all construction efforts, especially the construction of information technology, should go beyond the limits of concepts, adhere to the problem-oriented principle, and be more intensive, more intelligent, more economical, more practical and more able to be shared than the corresponding construction projects in the past.

6.5.2. The Importance of Overall Planning and Top-level Design

South-South cooperation in the framework of smart society must take full account of the needs, capacities, and technical levels of both partners, which should be used as a foundation for carrying out integrated planning and top-level design. First, top-level design should consider and design all aspects and levels of the whole architecture from a global perspective. Creating a good, humanistic environment should be the central goal, which would be namely "people-oriented". Only in this way can we build a smart society into a home where people can live in harmony with their surrounding environments. At the same time, comprehensive planning should be undertaken in the fields of site, network, hardware, software, data, and manpower. Data and software systems need to be designed holistically. Within a certain region, we should plan as a whole and rationally divide the smart social information system, implementing the basic models of data sharing in a more comprehensive way.

6.5.3. The Importance of Data and Network Security

Great importance must be accorded to data security, network security threats and the destructive power of network attacks. Southern countries need to formulate laws and regulations and establish special departments specifically devoted to data security and network security protection. There is a need to strengthen cooperation between government agencies and improve the management of ICT to ensure continuity of online services and protection of public data and privacy.

At the same time, a cooperation mechanism of network information security between Southern countries needs to be established, and dialogue and communication between the southern countries needs to be strengthened to raise awareness of the importance of regional network security cooperation. Such a mechanism would gradually narrow differences and form consensus on the status quo, as well as goals and paths of regional network security. At present, we can start from the common challenges faced by those Southern countries, such as the protection of key network infrastructure, the fight against cyber-hacking and cybercrimes, and the fight against cyber terrorism, and gradually develop more areas of cyber security cooperation.

ASEAN has set a good example of South-South cooperation in cyber security. The first ASEAN ICT Masterplan (2010-2015) identfied bridging the digital divide as one of the six strategic thrusts (ASEAN, 2015). The next development of the ASEAN ICT Masterplan (2016-2020) put cyber security as priority Strategic Thrusts. ASEAN aims to build a trusted digital ecosystem, so that transactions and information exchanges will be safe, secure, and trustworthy (ASEAN, 2015).

6.5.4. Strengthening the Construction of Human Capital and Focusing on Cultural Differences

The construction and use of a smart society require information, talent and knowledge, so we need to pay special attention to the training of information technology talent

and strengthen the popularization of citizens' information knowledge. In addition to economic factors, the main reasons for the low overall level of information technology in the national economy, the weak competitiveness of information industry and the backward comprehensive ability of information technology in Southern countries are the small numbers and limited quality of information technology talent. Vigorous efforts must be made to promote reforms in the education system and to develop various ways to train information technology talent, especially within the framework of South-South cooperation.

All countries in the South yearn for rapid socio-economic development and a modern and smart society, and such common goals form the basis for promoting South-South cooperation. However, each Southern country has its own unique characteristics. There are differences in political systems, organizational structure, cultural habits, information bases, personnel technical literacy, and so on. We should pay attention to these cultural differences and also strive to maintain diversity.

6.6. Concluding Remarks

The models and ways of building a smart society through SSC should be multifaceted. One way would be to make full use of existing SSC platforms and relevant international and national cooperation agendas. The 2030 United Nations Sustainable Development Agenda, the AU's Agenda 2063[83], the Beijing Declaration on Building a Closer Community of Destiny in Central Africa, and the Forum on China-Africa Cooperation-Beijing Action Plan (2019-2021) are all excellent political policy bases.

By 2063, the necessary infrastructure will be in place to support Africa's accelerated integration and growth, technological transformation, trade and development. This will include high-speed railway networks, roads, shipping lines, sea and air transport, as well as well-developed ICT and the digital economy. A Pan-African High-Speed Train Network will connect all the major cities/capitals of the continent, with adjacent highways and pipelines for gas, oil, water, as well as ICT Broadband cables and other infrastructure (AU, 2015).

The Forum on China-Africa Cooperation Beijing Action Plan (2019-2021) evidences that China will support African countries in building "smart cities" and enhancing the role of ICT in safeguarding public security, counter-terrorism and crime-fighting efforts, while working closely with African counterparts to uphold information security. In addition, China will focus on implementing projects on clean energy, wildlife protection, environment-friendly agriculture and smart cities while also supporting Africa's endeavours toward green, low-carbon and sustainable development (MFA, 2018).

83 AU's Agenda 2063 is a strategic framework for the socio-economic transformation of the continent over the next 50 years for Africa countries. Its builds on, and seeks to accelerate the implementation of past and existing continental initiatives for growth and sustainable development. For more information, see https://au.int/en/agenda2063

Smart society and information construction are major social projects. We must mobilize and organize various social forces to participate in the construction of a smart society based on high-priority support from governments. In addition to the existing international cooperation framework, in the construction of a smart society, the South-South cooperation financing channels and investment models should be expanded. At present, smart society financing receives most of its investments from central and local governments, which fall short from meeting the demand of countries in the Global South. In terms of financing, the Global South should vigorously promote the P3 (Public-Private Partnership) model and attract more private capital and social capital to join the construction of a smart society.

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CHAPTER VII

The Internet and Business Process Outsourcing in East Africa

7.1. Introduction

If we begin thinking through questions surrounding the dynamics of globally distributed flows of information and value creation, we quickly see that even the simplest interactions can be preceded by intricate, complex and socially embedded interactions and decision-making processes among economic actors.

This chapter examines if and how the Internet can enable development of an industry that is predicated on bridging geographical distances between low-income and high-income countries via ICTs: the business process outsourcing (BPO) sector. We selected the local BPO sector of Kenya as a case study for a number of reasons. Kenya has sought to benefit from an incisive event for the ICT landscape of East Africa: the arrival of the region's first underwater fibre-optic cables to the coasts of Kenya in 2009 (Graham et al 2015). This large-scale upgrading of Internet infrastructure offered a unique opportunity to empirically examine the short and medium-term effects of ICTs on economic development and also to compare visions and hopes with the realities that have materialized over the last five years. Moreover, policymakers have singled out BPO as a potential game changer for employment opportunities and economic transformation. This means that the sector could serve as an important testing ground for the hopes of global connectivity and integration wrapped up with the arrival of the cables.

Concrete contexts and histories shape the ways in which actors engage with technology, and thus needed to be taken into account for this analysis. Even more importantly, the present case is an industry that is inherently based on interactions between actors that span (sometimes very large) geographical distances, and so we found it useful to hone in on the very notion of "connectivity". In other words, while much popular discourse around globalization paints a picture of individuals seamlessly connecting to other individuals on the other side of the planet once infrastructure is in place, it is essential to remain sensitive to the intermediating influences that build cognitive and perceptual connections between actors: connections that are based on technological connectivities.

Ultimately, we need to broaden our understanding of connectivity far beyond *Internet connectivity*, in the sense of mere technology-enabled accessibility. For us, the focus was on the real changes in the opportunities and outlook of economic actors, and so we saw enhanced Internet access only as a means to desired ends, such as business deals, increased revenues, employment, learning, economic inclusion, integration and transformation, and so forth. This means that we examine the more far-flung effects of

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the new technological infrastructure in East Africa by also scrutinizing changes in actors' *social and conceptual connectivities* (Graham & Mann, 2013) as well as *enablers* that are complementary to Internet connectivity.

This chapter is structured as follows: As context and background, section 1 gives readers an overview of Kenya's ICT landscape, charting out the infrastructural conditions that the emerging BPO sectors have sought to latch onto. Sections 2 and 3 present the BPO sector, starting with the categorization of subsectors relevant for understanding the BPO value chains and networks, followed by in-depth analyses and a discussion. Sections 4 and 5 provide policy recommendations and conclusions.

7.2. Internet Connectivity and Government Policy in Kenya

Before delving deeper into an analysis of value chains and networks in the Kenyan BPO sector, it is necessary to arrive at a basic understanding of the ICT infrastructure and policy conditions, as well as high-level information on the BPO sector and the governments' BPO-related policies. East Africa was the last major geographic region of the world connected to the global fibre-optic grid, but by 2010, three undersea fibre-optic cables connected the region to international networks.[84] These cables brought the possibility of much lower Internet costs and higher Internet speeds to the countries of the region.

However, users were not automatically "switched on" after their arrival. The fibre-optic cables brought bandwidth to the ports of Mombasa and Dar es Salaam, but much work was, and is, needed to transport that bandwidth into homes and offices. Mobile telephony and wireless technologies have played a much stronger role for "last-mile" access in Kenya compared to high-income countries: fibre-connected buildings use Wi-Fi extensively, and 2G+, 3G and most recently 4G mobile technology (from low to high bandwidth) has been deployed, enabling mobile Internet access. Although the economies of such technology are more favourable to an East African context than the extensive roll-out of fixed-line Internet infrastructure to individual households, the cost per connected user is still often prohibitive in sparsely populated areas, which limits scaling economies of networks at large (Williams, 2010), meaning that affordability issues remain for private households as for businesses.

84 These cables included: (1) SEACOM, a privately owned cable, dominated by investment from South Africa, (2) EASSy, a public-private partnership between predominantly South African private investors (Telkom/Vodacom, MTN and Neotel) and development financial institutions (World Bank/IFC, EIB, AfDB, AFD, and DfW) and (3) TEAMs (The East African Marine System), an initiative led by the Kenyan government in partnership with Kenyan Internet service providers (ISPs) and Etisalat, a telecommunications company headquartered in the United Arab Emirates. Seacom was formed by the coming-together of Industrial Promotion Services (a branch of the Agha Khan foundation in Egypt which owns a 26.25% stake), VenFin Limited (now merged with Remgro Ltd.- both South African, which owns 25%), Convergence Partners (also South African and owning a 12.5% stake) and Shanduka (also South African and also holding 12.5%). The remaining 23.75% was held by Herakles Telecom LLC (a US company). SEACOM came online in 2009, followed by TEAMs and then EASSy in 2010. In April 2012, a fourth cable, Lion-2, arrived.

7.2.1. ICT and Internet Infrastructure and Policy

Besides its own investment in the TEAMS cable, the government has largely allowed the private sector to spread mobile telephony and Internet connectivity to its population. The main mobile network operators driving infrastructure deployments are Safaricom, Airtel, Essar and Telkom Kenya (operating under the Orange brand).

Kenya has developed an overall economic development plan, dubbed Vision 2030 (Republic of Kenya, 2007a; 2007b). Although the focus on ICTs is not explicit, the Kenyan government has also argued that the country should reduce its dependence on the agricultural sector and instead hone in on the export of services. The arrival of fibre-optic cable in Mombasa was subsequently seen as an important enabler for this economic transformation (Graham et al. 2015). The policies were paralleled by an enhanced sense of optimism and an impending "ICT revolution" (Graham & Mann, 2013).

Kenya is widely considered an East African success story in the realm of ICTs because of its status as a Pan-African "ICT Hub". Furthermore, it is already characterized by relatively impressive ICT penetration statistics. For the last quarter of 2013, the Communications Authority of Kenya (which succeeded the Communications Commission of Kenya) reported a mobile subscription penetration of 76.9%, a broadband penetration of above 3%, and an Internet penetration (using the broadest definition of 'Internet') of 52.3%, of which 99% were mobile Internet subscriptions.

7.2.2. The Evolving BPO Sector and Policy Phases

2007-2011: BPO as a Key Government Strategy for Economic Growth

BPO was one of the six key sectors explicitly highlighted in the Kenyan government's Vision 2030 (Republic of Kenya, 2007a; 2007b). In 2007, before the arrival of the cables, the BPO sector in Kenya employed only about 4,000 people, contributing about 0.01% to the nation's GDP (Republic of Kenya, 2007a; Omondi, 2012). Nonetheless, BPO was estimated to ultimately create at least 20,000 direct jobs and contribute 10 billion Kenyan shillings (USD 120 million) to the country's GDP; this economic impact was expected to be generated both by Kenyan firms and large multinationals. The hope was that BPO would become the "sector of choice [for] employment among youth and young professionals" (Republic of Kenya, 2007a: 81). Envisioning Kenya as the top digital offshoring destination in Africa, the government called for the creation of a 7,500 seat "BPO park" at the Athi-River Export Processing Zone, an aggressive marketing campaign, the development of targeted training programmes, the development of a BPO incentive framework and initiation of a BPO and Contact Centre policy. The government also established the semi-autonomous Kenya ICT Board, which, among other goals, was set to promote the BPO sector.

The Kenyan government intervened to reduce bandwidth costs, but it focused more directly on the BPO sector. In 2007, the Kenyan government used KES 78 million (approximately USD 920,000) from the World Bank Transparency Communication and Infrastructure Programme (TCIP) to subsidise the cost of satellite bandwidth for BPO companies while the country waited for the East African submarine fibre-optic cables to arrive. The government put much emphasis on BPO over other ICT subsectors. In 2009, the government commissioned the consulting company McKinsey to compile a report on Kenya's niche within the global market for BPO/ITES (Kariuki, 2010). It confirmed that Kenya could become competitive in the call centre and customer service niche, stressing, in particular, the neutral English accent of Kenyan graduates. The Kenya ICT Board also visited countries such as India and the Philippines to learn how these countries had developed their BPO sectors. The Board's immediate mission was to find and develop Kenya's particular national comparative advantage vis-à-vis other destinations in the world.

2011 Onwards: A Shift Toward High-Value Added ICT Services

Following the first experiences after the arrival of the cables, the government began to change its approach. In particular, it shifted attention away from call centres to higher-value producers like software engineers, most visibly in the celebration of cases like M-Pesa[85] and Ushahidi[86]. In line with this tendency to take other ICT-based industries into account, by 2012, the Kenyan ICT Board had changed its mandate from promoting BPO to promoting ICT services at large. Similarly, the 7,500-seat BPO park in Athi River was re-conceptualized as Konza City, a more general kind of "technopolis". The Kenyan government has also started to engage more actively with the emerging entrepreneurial and ICT start-up communities forming around the iHub and other technology innovation hubs in Nairobi (Graham & Mann, 2013). For example, the Kenya ICT Board, with support from a World Bank loan, funded the Nailab business accelerator, located in the same building as the iHub, in early 2013. In sum, the Kenyan government has largely shifted away from its narrowly focused promotion of BPO toward the encouragement of broader ICT entrepreneurship and the modernization of its public services and government programmes.

85 M-Pesa is a widely noted mobile money system that allows people to deposit, withdraw, and transfer money with a mobile phone.

86 Ushahidi is a software company, founded in Nairobi that develops open-source software for information collection and mapping.

7.3. Understanding Kenya's KPO

7.3.1. Business Process Outsourcing

Kenyan companies have historically found it difficult to get direct access to clients and international work. Faster Internet connections were seen as a way to make this easier, cutting out the middleman and enabling Kenya's access to international clients and levelling the playing field between Kenyans and competitors in Asia. Research shows that this has not happened. Geography and distance continue to be important factors and how the fibre-optic cables have not removed intermediaries in the sector.

7.3.2. Understanding Kenya's BPO history

In the early 2000s, Kenyan companies began experimenting with informal BPO work. Internet cafés were transformed into BPO operations afterhours, taking on small amounts of work from online outsourcing platforms like guru.com, elance, o-desk, and u-test. Stories about such companies fuelled optimism about the potential for BPO in Kenya. Because Kenyan companies had easily gained access to this kind of informal work without any intervention from government or private sector associations, many within the country assumed that the country's potential could be scaled up with the right types of capacity building and training.

Established businesspeople started to invest in the sector. In 2005, Kencall opened, followed by several other more formal BPO businesses: Technobrain, Horizon, Adept and Direct Channel-Simba Technologies, among others. These companies had workforces ranging from 100 to 500 workers and initially focused on securing big contracts from international clients (primarily U.S. and European firms). Of the companies listed above, almost all reported close to 100% international clients before 2009. As the sector began to grow, a Kenyan BPO and Contact Centre Society was formed in 2007 and membership soon grew to more than thirty. In 2008, Kencall won the Best Non-European Call Centre award at the Call Centre Focus Conference, the biggest trade show in the industry. This effectively began to put Kenya on the outsourcing map.

7.4. Thwarted Prospects in the Wake of the Arrival of Fibre-Optic Cables

Unfortunately, this optimism proved short-lived. By the end of 2008, many BPO companies were experiencing difficulties. Companies like Global Connection and Continental had closed, and even the largest firms were struggling (Kundu, 2008). Internet prices had not dropped as much as hoped, and firms found themselves struggling to work cost-effectively.

The global recession did its part and made international firms less likely to engage with unknown African firms (Omondi, 2012). By making it difficult for clients to openly endorse a new destination, the global recession may have dried up opportunities for new outsourcing destinations while maintaining a steady (but less visible) flow to already established countries. In other words, the global political and economic contexts at the time of the arrival of fibre-optic cables in 2009 did not afford much visibility to Kenyan firms.

7.5. Reorientation Toward Impact and Domestic Outsourcing

As a result, after 2009, many Kenyan BPO firms went out of business, and others actually managed outflows of BPO work, as in the Rwandan case. Yet others have turned to "impact-sourcing",[87] attempting to position Kenya as a host to corporate social responsibility schemes. The impact sourcing company Digital Divide Data opened an office in Kenya, and Samasource began to find partners to whom it could pass on work from its U.S. offices. The Rockefeller Foundation and Enablis (a foundation that promotes entrepreneurship in low-income countries) also partnered to open a rural impact sourcing BPO project in the city of Kisumu.

The Kenyan government's approach began to shift noticeably. The Kenya ICT Board started to allocate funds to Konza City instead of directly to BPO promotion, and the government adjusted its communication efforts to distance itself from a focus on the BPO sector, e often using terms such as "ITES" (IT enabled services) and "software development" instead of BPO. Yet, the most striking development concerning BPO in Kenya was a clear shift toward the local market. Some smaller companies had a higher share of international inflows of work, but this was more piecemeal and usually focused on lower-value impact sourcing.

7.6. Major Challenges

7.6.1. Direct Access to Clients

First, Kenyan companies underestimated how difficult it would be to access international work opportunities. While physical Internet connections are often presented as the key that allows countries to engage in international service work, the difficulty in actually communicating directly with clients remains. The importance of physical proximity to customers in acquiring expertise and access to global networks of work must be underscored. This is one of the primary reasons that impact-sourcing intermediaries like Samasource and Digital Divide Data

87 'Impact-sourcing' is outsourcing in which work is only offered to members of marginalized and vulnerable populations.

have been so successful in sourcing work: they have offices in the United States and use these connections as the foundation of their business models.

Kenyan companies also found it difficult to pull away business from India and other places. In many cases, Indian companies are instead passing on low-value work to Kenyan contacts. Most Kenyan companies do not have enough capacity to attract a big client, while being unable to attract enough work to add enough seats to build this capacity in the first place.

In sum, it remains relatively rare for direct linkages to exist between international customers (i.e., firms in need of a service) and Kenyan BPO providers. Chains of intermediaries and consultants are typical, where big contracts are split and divided into smaller contracts distributed among numerous companies.

Understanding BPO Work

Kenyan companies and policy-makers also underestimated the difficulties of understanding which business processes BPO work at a distance would rely on, and they struggled to make sense of how the sector functioned (Mann & Graham, 2013). Larger and more professional firms like Kencall and Horizon drew on Indian, Filipino and American consultants to help structure operations and train workforces. Impact BPOs were likewise supported by international backers. As an example, Caroline Wanjiku, the CEO of the impact-sourcing company Daproim travelled to the Cambodian headquarters of Digital Divide Data while workers from Impact Sourcing Africa travelled to India to receive training from their Indian partner Ruralshores (Sheth, 2013). Smaller businesses that did not have this international support found their operations to be unprofitable. In particular, managers from smaller companies struggled to make sense of the variable costs and values of different forms of work and thereby judge their own capacities to meet deadlines and make profits.

Because smaller Kenyan companies lacked adequate knowledge about the sector, many made errors in judgement. Other Kenyan BPO operators faced similar problems of scale. In order to compete and get the kinds of clients they needed, they required larger workforces. But in order to acquire these larger workforces, they needed more consistent and profitable streams of work. They found themselves in a vicious cycle, compounded by their inexperienced management teams and the tendency for young BPO workers to move on to other jobs during slow periods. In turn, prospective clients looked at scalability and long-term capability when making the decision to come to Kenya.

Comprehending value was not an easily disintermediated process for either Kenyan managers or potential clients. Difficulties in calculating the intangible value and the immaterial labour of BPO work made negotiating new contracts challenging and forced Kenyan actors to rely on existing BPO networks (Steinmueller, 2002; Marazzi and Mecchia, 2007; Spence and Carter, 2011). These networks were characterized both by altruistic

wishes of foreign partners to help Kenyan partners and by more straightforward profit calculations. While some Kenyan managers believed that Indian and other foreign associates passed on work that Kenyan workers were better positioned to complete (due to their clearer English accents), others suspected collaborators were only passing on low-value contracts, while retaining higher-value contracts. Accordingly, many companies struggled to distinguish between profitable work and exploitative work.

Viewed through a national lens, the closure of several firms made the entire sector seem immature and risky. The good faith that had been extended in 2008, when the Kenyan marketing campaign was in full swing, had faded by 2012 and 2013, and larger Kenyan BPOs found themselves on the back foot. They had to find a way to restore the faith of international clients, who needed assurances that Kenyan companies were capable of taking on international contracts.

7.7. Moving Beyond Domestic BPO? How?

Domestic outsourcing became a way for Kenyan managers to make sense of the industry and to prove their value to clients within a local setting. It would also allow them to experiment with higher value BPO through automation and digitalization projects in Kenya and the broader East African context. This re-orientation was supported by key government officials in the ICT Board and the Ministry of Information, who saw local outsourcing as a way of increasing efficiency and making the economy more competitive.

Domestic outsourcing would allow Kenyan managers to retain their workers, build up competencies and expand their portfolio of clients. It was not *just* a matter of turning to domestic clients in the absence of international clients, but rather it was also an attempt to use the domestic market as a way of building global recognition in the long run.

7.8. Combining Market Knowledge with Technical Skills to Address Local Markets

The most successful companies are those that had upgraded an existing ICT system for a large incumbent firm or government agencies. This model of software and IT system development tended to offer a secure revenue stream and had low risks, but again larger and more established companies had advantages in gaining access and the trust of government bodies and larger companies.

Younger developers and start-ups were more likely to try to build their own mobile applications, often aimed at the mass market. In many cases, the most successful applications were not produced and marketed by developers alone, but rather by people

with a deep knowledge of the targeted market who drove production and distribution, relying on a developer co-founder for the technical part. In terms of expansion strategies, most Kenyan developers are focused on the Kenyan and wider African market and are apprehensive about expanding further.

7.9. International Companies as Bridge Builders for Local Firms

Kenya's rapid uptake of ICTs has also attracted international IT companies into the country. These international firms now have fairly well-established regional businesses, usually based in Nairobi, and have skilled workforces spread across many different countries, thus allowing them to enjoy economies of scale. Importantly, these international businesses operate using tiers of knowledge and solution-finding. If a problem cannot be solved in a satellite office, it is forwarded to the African headquarters in Kenya. If the Kenyan office cannot solve it, it is then forwarded to a foreign office or a partner office, typically in India (we spoke to five firms that operate a model similar to this one). One Kenyan company, established by an Indian manager, estimated that 75% of his technical expertise was located in India, but that Kenya had strong capacities both in mobile payments and in local content development. Another manager estimated that building content in Kenya cost him "15 times more" than getting it done in India. In other words, these companies are increasingly operating and thinking at the multinational level. Such examples are reminiscent of Moriset and Malecki's arguments that large ICT-based businesses can exploit both agglomeration and dispersion economies, depending on task requirements and the locus and transferability of knowledge (Malecki & Moriset, 2007; Moriset & Malecki, 2009). Yet, the presence of international companies often functioned as a bridge builder for local companies to access foreign clients.

7.10. Analysing the BPO and the ICT Innovator Sectors in Kenya

The story about the impact of Internet connectivity on Kenya's BPO sectors is not a simple one. The idea of an ICT revolution that would generate widespread economic growth after the arrival of the fibre-optic cables did not materialize evenly and across the board. In the BPO sector, changing connectivity has not radically transformed the roles that East Africa's geography and social relations within East Africa play. The Kenyan BPO sector ended up focusing largely on domestic and regional deals instead of clients from outside of Africa. The BPO sector is intertwined with, and relies on, other sectors of connectivity-based enterprises, namely ICT innovators and ICT connectivity enhancers.

7.11. Unique Characteristics of Connectivity-Based Enterprise Sectors of the BPO SectorDiverse but Persistent (Re-)Intermediation

The BPO sector, more than the other examined sectors, was characterized by powerful mechanisms of intermediation and an array of hierarchical value chain structures. Even though the region had overcome some infrastructural barriers through improved Internet connectivity, other barriers remained between BPO clients and providers.

Internet connectivity is undoubtedly an enabler, but it is not a sufficient solution to the difficulties that East African BPO operators face in engaging with clients over distance. Although individuals and smaller companies gain access to inflows of international BPO work from distributed work platforms, they usually only offer short-term, piecemeal work; which is hardly the kind of work that can sustain a formalized local BPO business. Figure 1 shows a stylized value chain for East African BPO operators.

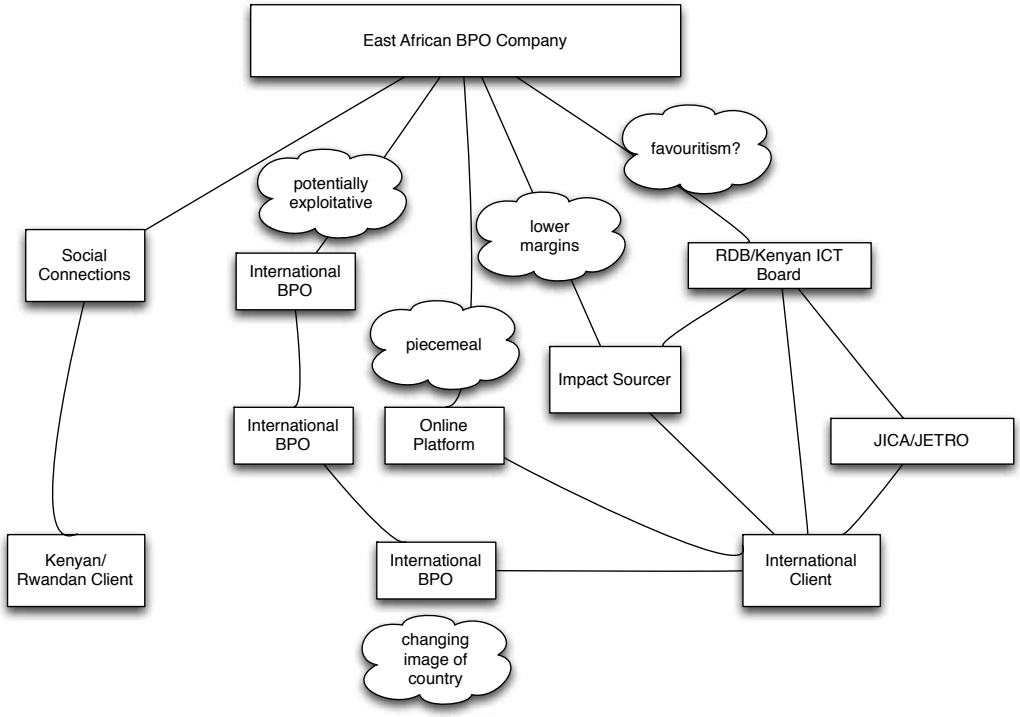

Figure 1: BPO Chains

Figure 1 illustrates that there are numerous ways that East African BPO companies can try to access work. First, a company can try to access work from domestic clients, using its social connections and its sales staff to physically visit premises and conduct pitches. Second, the East African BPO company can gain access to international inflows of work from either an international client company or an intermediary international consultant.

Third, an East African BPO company can gain access to international inflow of work from distributed work platforms. Fourth, the East African BPO company can gain access to BPO work from impact-sourcing intermediaries like Samasource or become a local partner for an impact-sourcing company like Digital Divide Data. Fifth, government organizations like the RDB and the Kenyan ICT Board, in collaboration with foreign government agencies, can intermediate and broker work opportunities on behalf of East African BPO companies. These observations support the idea of "re-intermediation". Distributed work platforms, by virtue of their design principles, offered only certain kinds of barely profitable and non-sustainable work in a "take it or leave it" format. Better connectivity also allowed international consultants and more powerful companies to repackage and redistribute work to Kenyan companies that are lower down in the chain.

7.12. Underestimated Market Forces of Global BPO Value Chains

Policymakers, popular discourse, and BPO managers themselves originally underestimated the complexities of value creation and extraction in the BPO sector. They followed a belief in the (at face value enticing) vision of BPO as a simple and ICT-mediated redistribution of work from rich countries to places with labour cost advantages. Nevertheless, an in-depth understanding of the complexity of the BPO market and industry has only started to slowly evolve in the recent past.

In reality, international inflows of work from outside of Africa were the exception in Kenya. More necessary conditions than just Internet connectivity (such as social connections between clients and suppliers, service quality, higher skill levels, and scale efficiencies) would have to be met before local BPO industries would experience a boost from workflows arriving from international clients. In Kenya, BPO operators were stuck at a limited capacity (quality and available scale) that did not allow them to work efficiently, which in turn would have been necessary to expand and/or attract better skilled workers.

The downside of the Internet's "flattening" impact on the global BPO sector was also apparent: profitable BPO work had already been commoditized, and without differentiation and an a priori trust-deficit, Kenyan businesses could not compete with Indian and other Asian BPO suppliers. Instead, only very low-value work sometimes got passed on from India, which did not support the countries' competitiveness in global markets.

7.13. Disparities in Workers' Skills on Multiple Levels Hamper Competitiveness

Multiple dimensions of human capital proved to be key assets for BPO companies, even for those that targeted what is usually considered "low-skilled" outsourcing work. Mostly

technical skills were concerned, but we also found soft skills, attitudes and work ethic to be important. Higher education institutions were found to be unable to fill these gaps comprehensively. The knowledge that they instil was often described as "theoretical", that is, not applicable or relevant in the marketplace. Employees often displayed a mind-set of lacking vision and ambition, resulting in lower performance. This implied that BPO providers had to train their employees themselves, offering courses in-house. In turn, this meant that they would have to make significant investments and build training competencies that were not part of their core business. Overall, BPO businesses struggled to understand and adjust to the multi-faceted skill gaps of workers, limiting their opportunities for value creation and extraction.

7.14. Challenges of Late-Followers: Learning and Building Trust Takes Time

Many in the sector went through a learning curve regarding the potentials and limitations of BPO work. The main learning outcome was that Internet connectivity does not eliminate the need for direct, trusted interactions with clients and an understanding of their needs. Both continue to be easier to achieve in markets close to the BPO operator's own location or when temporary physical proximity (Torre, 2008) can be established, for example during shorter visits of international clients. It appeared no longer possible for Kenya to achieve the overwhelming scale efficiencies of Indian and Asian operators. In contrast, as early movers, India and Asian countries had a unique opportunity to service clients from all over the world and establish their reputation and (national) brand over time.

Accordingly, seasoned operators in the BPO sector held savvy and level-headed conceptions about how changing connectivity was likely to alter the nature of geographical distance and social intermediation. They regularly encountered the challenges of accessing international work and knew that face-to-face contact and clients' favourable perceptions usually need to go hand-in-hand with Internet connectivity in the BPO sector. Dealings between foreign clients and East African companies need similar face-to-face contact and reassurance.

7.15. ICT Innovator Sector

7.15.1. Enterprise-Centric Value Networks

To discuss the ICT innovator sector, it is useful to distinguish between those businesses that implement ICT systems in existing companies (see "upgrading existing systems" in Figure 2), such as digitizing processes and building information infrastructures, and those companies that created new applications and software from scratch for the consumer market ("creation of new systems" in the figure below). The figure below depicts the stylized value chains of these two types of businesses.

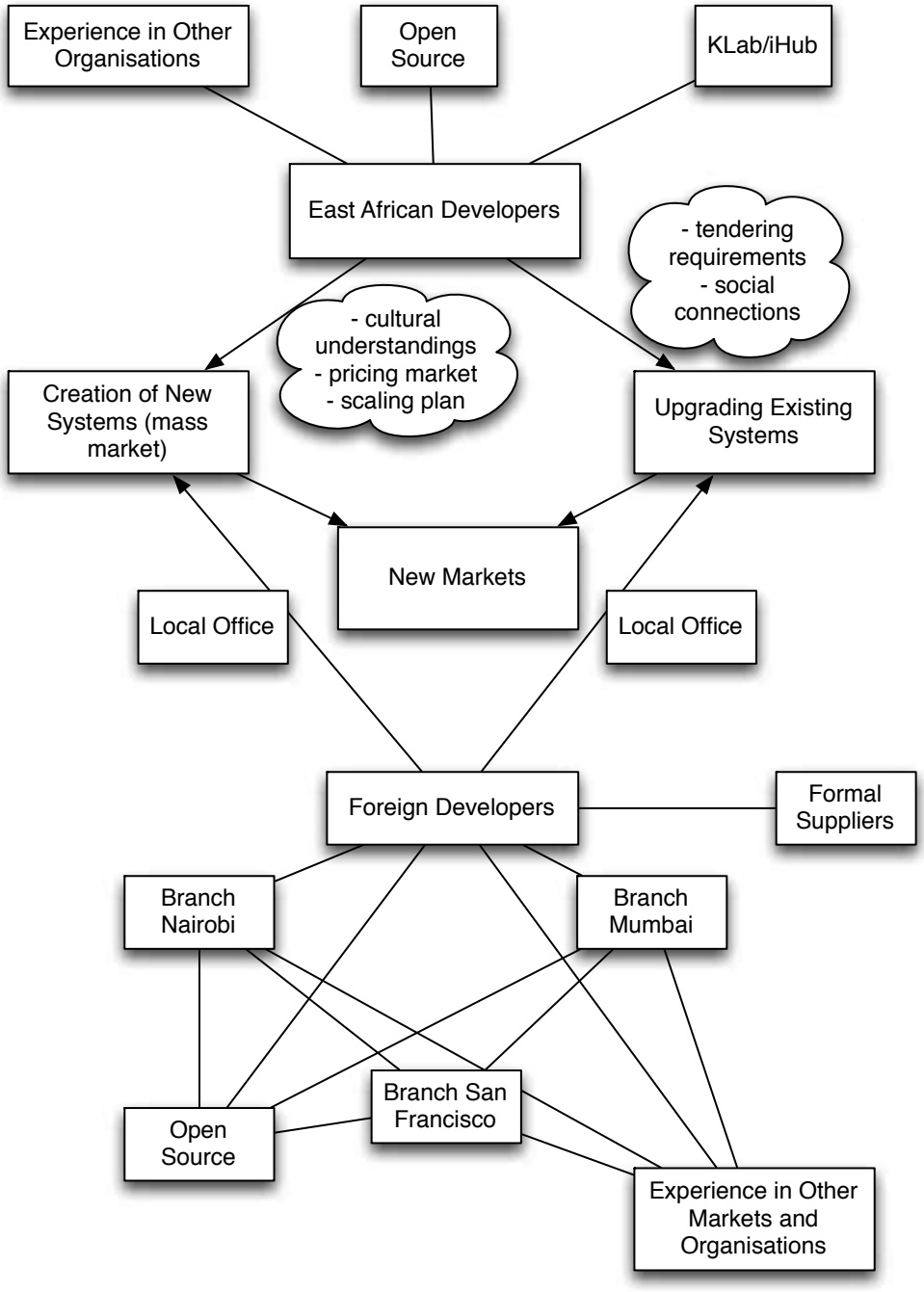

Figure 2: ICT Innovator Chains

As indicated above, East African ICT innovators accrue value jointly from their technical abilities and by applying those abilities to sell solutions within a local context. Technical expertise can be gained from open-source communities, educational programmes, and

experience in other organizations. Using this technical expertise, the developer can then either create a new system for the mass market (on the left of the diagram) or upgrade an existing system (on the right of the diagram). The ability of the innovator to develop an application or platform of a newly identified market depends on their understanding of the user, their ability to understand the market and pricing model, and their plan for scaling. The ability of an innovator to upgrade an existing system depends more on tendering requirements and also on social relationships with the organization in question. The potential to expand into new markets is further dependent on whether conditions and market structures in the new market resemble those of the existing market.

There are also differences in the value chain of foreign ICT innovators present in Kenya. They are more likely to be connected to, or embedded in, existing transnational social networks and have more experience selling to clients in their home markets. Because they recognize the difficulties of developing from afar, they establish a physical presence in East Africa in order to benefit from familiarity with the local markets. This combination and configuration of connections, skills and resources gives such companies distinct advantages for tendering. Despite a context of changing connectivity, and a theoretical ability to carry out non-proximate work, we therefore still witness a need for these firms to have a strong local footprint.

In sum, we see a less hierarchical array of value chains. ICT innovators are usually at the centre of a value network, rather than at the bottom of a value chain. They decide to develop an application or software that is new to a market, and thus appear to have greater influence over the conditions under which they operate.

7.15.2. Focus on "Local" from the Start

This aspect was mirrored in the growth and expansion strategies of ICT innovators, which, though ambitious, relied more on the decisions of business people and entrepreneurs as they reacted to immediately perceived market opportunities. This was contrasted with the BPO sector, where (at least initially) government interventions (including specific targets in Kenya) had set a vision and a course for the sector as a whole. ICT innovators also drew more substantially on technology innovation hubs such as kLab and the iHub to organise themselves by establishing grassroots communities that are not immediately driven by high-level policy.

The entrepreneurial approach implied a stronger and more immediate focus on differentiation and customer needs. From the beginning, this sector emphasized 'the local' where actors knew they would have competitive advantages over international actors. It appeared as if the ICT innovator sector had in part learned from failures in the BPO and other sectors.

7.15.3. For the Gifted Ones, a (New) Sense of Opportunity

Many entrepreneurs and software developers in the ICT innovator group felt that they were able to combine the best of both worlds (i.e., combine knowledge from a global world of software and entrepreneurial skills with unique local knowledge about subject-matter domains or traditional economic sectors), which international companies could not replicate. kLab, iHub and other technology innovation hubs again played an important role, since they provided bandwidth that allowed developers and entrepreneurs to access knowledge and resources available online (in particular, open-source software).

But hubs also provided networking opportunities that would allow ICT innovators to initiate real projects (sometimes formed as start-ups) during which they could apply and test their knowledge, and to find out who and what matters.

There are not many examples that would clearly point to large-scale or transformative economic effects of the ICT innovation sector at this point in time. For example, businesses in the ICT innovation sector rarely offered mass employment. It is therefore difficult to see any obvious trickle-down effect of a few entrepreneurs' success, and thus far it remains unclear if the ICT innovation sector can ultimately fulfil the hoped-for results of a rising BPO sector. It will be important for future research to better understand whether innovation clusters around technology hubs can become gateways for fresh talent to enter into circles of expertise and opportunity, or whether they create an exclusive elite that does nothing to alleviate economic inequalities.

Nonetheless, Kenya, in particular, has used the ICT innovation sector to regain the sense of opportunity around ICT that had briefly been lost after the sobering choke on the BPO sector around 2008 and 2009. Now it aims to position itself at eye-level with other African ICT start-up hubs, particularly Nigeria and South Africa. In this context, Kenya is starting to build a reputation as an exporter of ICT applications to other countries with markets where conditions are similar. This includes mobile money applications, but also mobile agricultural systems, mobile health systems, etc. In other words, we have seen a shift where conceptual connectivity (understood as foreigners collectively and universally trusting locals) has been increasing for one sector and decreasing for another: International BPO customers continued to generally distrust "Kenyan BPOs", however international actors, especially in impact investment and international development circles, started to give "Kenyan start-ups" an upfront trust and excitement bonus.

7.16. ICT Connectivity Enhancer Sector

7.16.1. Dynamic and Diverse Value Chains and Networks

As a broad category, more dynamic and diverse value chains and networks are present

in the connectivity enhancer categories of companies. Both small and large companies were constantly changing their products and relationships in response to technological change. Figure 3 depicts these value chains in a stylized fashion. To introduce a useful distinction, the diagram differentiates the value chains of relatively informal, independent and small companies (such as freelance website designers in Kenya) on the right, and the chains of a more formal and larger companies, often networked across Africa (such as the aforementioned network hardware company), on the left. We will simply call the one category 'informal' and the other 'formal' in the following discussion, even though the differences are actually more complicated.

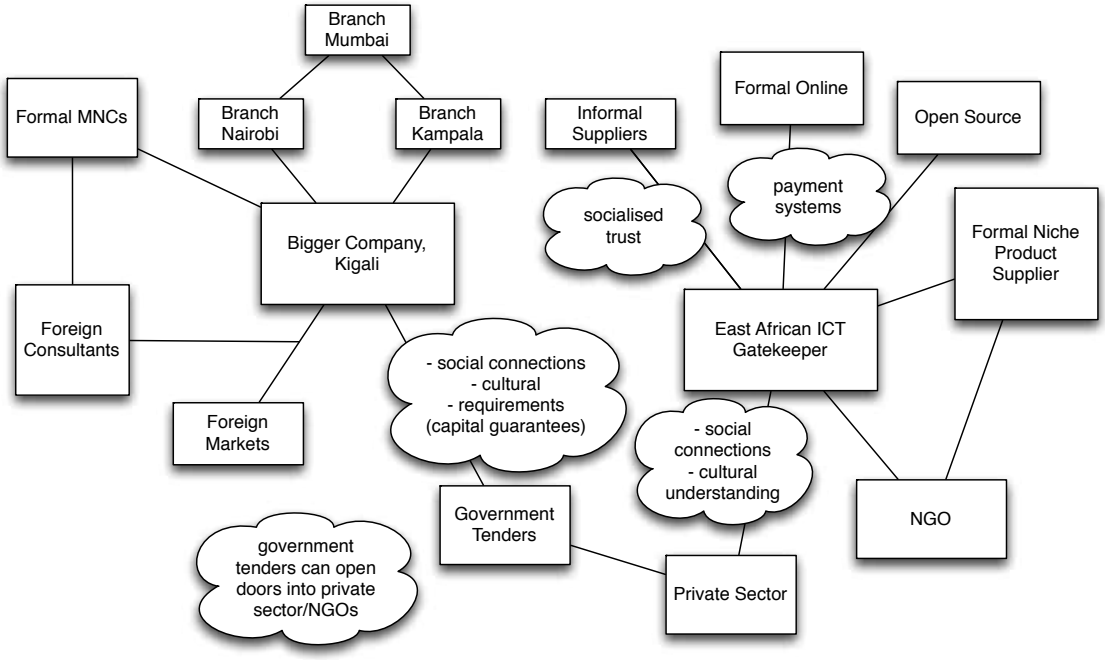

Figure 3: ICT Connectivity Enhancer Chains

International connections for informal companies usually entail sourcing some inputs from informal suppliers in other countries. The informal connectivity enhancer usually attempts to establish a social relation and trust, maintaining contact through communication technologies following short visits. Inputs can also be sourced through online channels using credit cards or through interacting with open source communities. Informal companies sometimes transition to a more formal status by establishing codified relationships with niche suppliers. The clients of such companies tend to either be either civil society organizations and NGOs, or the domestic private sector. In both cases, trust and occasional physical visits are used to gain access to opportunities and reinforce relationships.

The formal companies on the left of figure 3 maintain relationships with other partners, often within a more formalized regional network. Many of the companies in our sample had their headquarters in Nairobi, while keeping offices or representatives in other

countries. These kinds of companies were more likely to maintain ongoing relationships with multinational corporation (MNCs) and otherwise established companies in other markets. They also use these relationships to themselves enter new markets. They have a stronger focus on applying for large contracts and government tenders.

7.16.2. Transitions from Informal to Formal Connectivity Enhancers or ICT Innovators

Interestingly, working as or for an informal connectivity enhancer business can lead to transitions toward more formal employment or the take-up of an entrepreneurial career as an ICT innovator. Given its longer ICT sector history, this has been observed more often in Kenya: some young Kenyans managed to create niches for themselves in the early 2000s and have now established themselves as competitors to the big IT companies with connections to India. For example, by starting with self-taught website design, individuals can build up their technical abilities and were able to transition into other fields.

Today it is much harder for young Kenyan entrepreneurs to capture "low-hanging fruit". On the other hand, with changing Internet technology, we see customers' changing needs for new services that enhance the value of Internet connectivity. Here, Kenyan informal enterprises may have advantages over formal ones if they can use their flexibility as well as their familiarity and cultural knowledge to better understand, and capture value from, the customers. East African governments might also be well-advised to think about their tendering requirements, considering how to design them in a way that smaller, local, companies have a fair shot at competing for government and parastatal contracts.

7.17. Commonalities of Connectivity-Based Enterprises

7.17.1. Skills, Learning and Knowledge as the Key Link Between Connectivity-Based Enterprises

The most important link between the value chains and networks was the dynamics of learning and skill formation. Across all sectors, technical skills were important. Naturally, software development (and related skills such as website design, graphic design, mobile application development, etc.) was a field that was important for all three sectors (in particular once the BPO sector had moved beyond call centres). Internet connectivity, especially by providing access to open source software communities and resources, had a meaningful impact on enhancing the skills of Kenya's work forces. Moreover, there is a positive feedback loop: the stronger the skill base, the stronger the value addition of the connectivity-based sectors, the more value can be extracted from Internet connectivity itself (e.g., through network effects and a greater number of services), the more attractive it would be to obtain skills, the more people would achieve software development and general ICT skills, etc. In other words, the value of Internet connectivity and the value of

ICT-related skills and, in particular, software development skills mutually enhance each other over time.

It was also very clear that actors were not able to build connectivity-based enterprises based on the technical skills that they received at local universities and schools alone. Instead, hands-on mentoring and training beyond technical skills, coupled with exposure to new contexts and networking opportunities, usually generated individual success stories. International exposure, in particular, enables actors to leverage the "best of two worlds", using social connections and applying new skills to local contexts. Here, the matching and levels of skill sets was crucially important; BPO companies struggled because of a lack of both qualified workers and qualified middle managers. Similarly, software developers were often missing business skills and acumen to develop profitable ICT innovations. In other cases, the limited number of qualified software developers could not be retained when they were not given good enough conditions, which in turn limited the scalability of BPO businesses. In other words, the supply of *matching* labour can be nontrivial even in ostensibly low-skill sectors like BPO workers, and a lack of tacit and experiential knowledge can be a key barrier that might not be obvious at first sight.

This also implied that workers and entrepreneurs needed time to learn and advance. Kenya's ICT innovator sector, for instance, benefited from a nascent IT and ICT industry that had been established long before the arrival of the fibre-optic cables. Similarly, the country's BPO sector needed to learn difficult lessons on BPO value chains and the (im) possibilities of attracting international work the hard way.

It appeared that changing connectivity certainly enabled the creation of businesses that otherwise would not have been possible, but this did not spare them from the effort associated with experimenting, learning, and sometimes failing, before they could better understand and more easily manoeuvre through the complex market dynamics of connectivity-based enterprises. Local knowledge spillovers (or transfer) within *and* between sectors, digitally mediated *and* face-to-face, played an important role in maintaining useful lessons, which might explain the recent prevalence of technology innovation hubs. Similarly, we saw that Internet connectivity was often only realized to be an insufficient enabler by itself once it had been made available; managers needed to learn about other complementary enablers.

7.18. ICTs Only Bridge Distance Once Social Connectivity and Trust Are in Place

It was also clear, across all sectors, that ICTs cannot replace or render superfluous the need to establish trusted social relations with clients and business partners to enable economic interactions. Existing social connections were very commonly a prerequisite for business deals.

This is particularly striking because all of the businesses, and in particular in the BPO sector, were predicated on ICTs' distance-bridging potential. They engage in value creation and extraction chains that serve (end) customers at a distance, without face-to-face interaction. However, this is often insufficient for the creation of any larger and more sustained economic transactions or relationships. In the BPO sector, the crucial necessary step that was often missing was a trusted relationship between a Kenyan BPO company and an international client that would give them a (large) outsourcing contract. Lacking conceptual connection—a collective and a priori trust between East African companies and foreigners—was often an important initial burden before any company could even be able to prove itself as trustworthy in a one-on-one relationship.

It was particularly interesting that businesspeople in different sectors held different views about ICTs having a limiting impact on distance and intermediation. According to Marazzi's (2007) argument, the appropriation of value from information (and ICTs) requires both technological infrastructures and "socio-cultural machineries" and forms of "cognitive capital". As countries like Kenya prepare to engage in flows of international service work, they must build up these kinds of infrastructures as well. But it is an inevitable challenge that much of this cognitive capital is grounded in social and spatial networks in other continents, and only some of it can be effectively mediated by digital technologies, usually once initial trust has been created through face-to-face interaction.

7.19. Domestic and Regional Markets Are Easier to Access and Can Hold Surprising Potential

Skills and knowledge as well as the role of trust directly embedded in social connectivities and represented in conceptual connectivity (in terms of international clients' notions of a sector in Kenya) were also the underlying reasons for a key finding of this report: namely, companies in all three sectors were largely focused on workflows within Africa.[88] In Kenya, businesses were mainly focused on Uganda, Tanzania, South Sudan and occasionally West African countries such as Nigeria. There were instances of trade outside of Africa, but most managers felt that their own economies and the economies of their neighbouring countries were most ripe for profit. They also believed that they understood these economies better than foreign (Western)[89] competitors and were therefore well positioned to expand into them. Furthermore, as the domestic market becomes a site for learning and experimenting, unexpected potentials can be revealed.

As aspects of everyday life, economic transactions and state services become increasingly

88 For ICT innovators that address ICT consumers, competitive advantage for addressing local markets was established less through direct social connectivities, and more from market knowledge.

89 Asian and Middle Eastern groups are also well accustomed to working in these contexts, and indeed within our sample, we found many Indian entrepreneurs and others with connections to India and the Middle East.

digital and digitalized in Kenya, rapidly growing domestic and regional needs appeared to constitute the most significant growth opportunities for East African connectivity-based enterprises. Over time, the shifts in focus toward local markets might actually provide the foundation for businesses to become more competent and gather the expertise necessary to compete beyond local markets.

7.20. Gateways and Gatekeeping

Finally, it is important to note the iterative pathways of transitions and upgrades of connectivity-based enterprises that were found in our sample. More prevalent and promising expansion paths proceeded from local to regional to global, and rarely was a "born-global" strategy realistic. Given the role of social connectivities, firms faced gatekeeping barriers and were typically able to use only specific kinds of gateways to enter new markets or transform their value chains. For example, large foreign companies started with large tenders when they entered Kenya; small Kenya-based ones often began with one formal contract with a foreign client that helped them to establish themselves. ICT innovators would start with website design or international and practical exposure and sometimes flourish from there. It might therefore be productive for government and large institutional actors to open up such gateways and avoid (perhaps unintentionally) acting as a gatekeeper with barriers such as overly rigorous tendering requirements that exclude small firms and that therefore keep them from growing.

7.21. Recommendations

The analysis presented above allows deriving a set of recommendations for government agencies, policymakers, industry associations, and development organizations that aim to foster sectors of BPO and connectivity-based enterprises. These recommendations apply specifically to the context of Kenya but, with contextualization, they could also be informative for other low-income countries in East Africa and beyond.

Building Skills on Multiple Levels

In "knowledge economies", the human capital and skills of a work force become a major asset for businesses. The same is true for connectivity-based enterprises in Kenya that are facing a large gap between their skill demand and the available supply. Technical expertise is beginning to improve, but from software development to call centres, lacking management and soft skills (such as marketing, time / task management and dependability) are often a strain on businesses' productivity and competitiveness. Higher education institutions are called upon to equip graduates with more comprehensive and applicable skill sets, including experiential and tacit knowledge. There is also room

for public private partnerships between universities, training institutions and enterprises (potentially subsidized or incentivized by government) to help students, freelancers and junior employees improve their job and income opportunities.

Identifying a Competitive Edge: Local and Regional Target Markets Can Be a Better Fit

Local connectivity-based sectors that target international customers are bound to face international competition. When attempting to support a sector that is already well established in other countries, policy should carefully weigh what competitive advantage the local sector will have over foreign competitors. labour cost advantages might not be sufficient and might not outweigh scale efficiencies and learning advantages that foreign competitors have already established. Competitiveness might rather be derived from unique knowledge of, and access to, local and regional markets. Geographical proximity can underlie the fit between the supplied and demanded expertise and also social connectivity. In most cases, local knowledge will be most relevant for local customers and not for international customers, so that the local market can be the site in which local competitive advantages are most easily actualized. International companies can face local competitive disadvantage due to lacking knowledge about ways of doing business or lacking social ties, or they might not find it worthwhile to pursue smaller projects. This fact thus offers local companies advantages even in sectors with value chains that are inherently based on Internet connectivity and scale efficiencies, such as BPO. Government incentives, such as funds and subsidies, can be an option to further improve conditions for local businesses, however these measures need to be based on a realistic and in-depth assessment of competitiveness and social connectivity, which in turn influence current and future opportunities for value creation and extraction.

Adopting a Holistic Perspective: Different Connectivity-Based Enterprise Sectors Are Intertwined

When establishing a connectivity-based enterprise sector such as BPO, policy needs to pay particular attention to other sectors that have related value chains and that rely on similar input factors. Beyond Internet connectivity, skills, reputation, regulation, the availability of mobile and electronic payments, access to risk finance, and several other factors matter as enablers for connectivity-based enterprise sectors. Vicious and virtuous circles within and across related value chains have to be considered.

Considering Social Connectivity: Relations Matter for Technologically Mediated Exchanges

Internet connectivity potentially allows connectivity-based enterprises such as BPO businesses to trade and perform services across the globe. However, there is an important difference between *accessibility* and *being accessed*. Beyond legal, economic, and infrastructure factors, connectivity-based enterprises, like any other business, rely on the awareness and the trust of their customers, suppliers, and partners to be able to make contracts and deals. These social

factors are usually best established through personal contacts and social relations. Social relations can be established online, but this is usually the exception. For most people and firms in the sector, initial and occasional face-to-face contacts are crucial, even if the actual service provision happens digitally and remotely. Enabling temporary geographic proximity and venues for face-to-face interaction—for example, during events, conferences, and business and outreach trips—should therefore remain an important goal for governments and industry associations, even in the BPO sector.

Building a Sector's Reputation: Certification, Quality Control and Transparency

Risks from a tarnished reputation are very real for connectivity-based enterprises. By definition, connectivity-based enterprises work with customers and suppliers that are in a different location and with whom they rarely have face-to-face contact. This means that trust is particularly difficult to establish and sustain. If clients are generally sceptical of a country's sector, an individual enterprise will find it all the more difficult to obtain a chance at proving itself as a reliable service provider. Government agencies, policy, and industry associations have a role to play in ensuring the good overall reputation of a sector. Certification programmes that confer seals of approval and that assure clients of quality standards could be one important lever. Another way might be to set up platforms for accredited connectivity-based enterprises, customers and intermediaries, enhancing matchmaking, accountability and the enforceability of contracts.

Setting Realistic Expectations: Collective Learning Takes Time

Sectors of connectivity-based enterprises are part of knowledge economies. Implementation of technological infrastructures, including ICT and Internet connectivity, is important, but actors need time to experiment and iterate through generations of value chains and networks that work for their context. Before any local sector will thrive, competitive advantages need to be identified and tested, and risks need to be taken; and all of this will be taking place within complex socio-economic environments. These is never a straightforward process that can be planned and predicted from start to finish. Policymakers and institutional actors need to allow for collective learning and knowledge spillovers between different actor groups, and between different places and social contexts. Multi-stakeholder workshops and training play a particularly important role in this context. This helps to speed up the process of iterative improvements, maintain realistic expectations, or abandon an agenda if it fails to meet expectations.

7.22. Concluding Remarks

In this chapter, we have outlined how policy, popular discourse and media became carried away by the promise of Internet connectivity as the fuel for the growth of Kenya's

BPO sector (see also Graham et al 2015). In fact, the development of this sector has been different than predicted and hoped for. We derive three main conclusions:

First, it proved hard to foresee "unborn" ICT sectors. New and unexpected value networks and actor groups emerge and develop over time. We saw that economic actors conduct myriad adaptations and small experiments, learning and adjusting to market realities. Policy-makers and high-level planners can set the course for growth in sectors of connectivity-based enterprises, however the analysis suggests that it is unlikely that the course will be kept with precision.

Second, before the arrival of the undersea cables in 2009, Internet connectivity was seen as a simple catalyst for economic growth, but this did not turn out to be true even for sectors of connectivity-based enterprises (Graham 2015). When it came to *accessing customers and markets*, geographical proximity still shaped social connectivity (through personal relations) and localized cultural understandings, and these factors appeared to be just as important or more important as Internet connectivity. Broadly, this study has thus confirmed that the appropriation of value from information and ICTs requires "socio-cultural machineries" and forms of "cognitive capital" in addition to technological infrastructure (Marazzi, 2007). Kenya should continue to build these complementary enablers, focusing, in particular, on improving skills and human capital on multiple levels. In other words, Internet connectivity generates its effects in interactions with other enablers of knowledge economies (such as skills and trust), and its maximum value will only unfold if and when such enablers are already in place.

Third, strategic opportunities to generate competitive advantages can differ markedly between global and local markets also for connectivity-based enterprises; trust and conceptual connectivity matter also for them. This study has shown that this resulted in Indian and other South Asian BPO destinations, as early movers, having an advantage as they were able to build trust and scale efficiencies before Kenya entered the global market. As a result, the need to be (socially, conceptually, physically) close made it difficult for East African companies to access international work opportunities and they depended, to a large extent, on international intermediaries and experts. These international networks served to administer the flow of commodified work across the world, both through their social knowledge of clients and through their cognitive capital in understanding the costs and value of information work. In turn, Kenyan connectivity-based enterprises have recently been able to capitalize on their unique local knowledge and social connectivities. Thus, the study has shown that, for BPO that is based on globally commodified service offerings, competitive advantage could not be derived from emulating previous success stories.

ICTs and the Internet have an intuitive appeal as powerful means to "make the world flat" and to enable seamless interaction and economic exchange across the globe, and indeed, ICTs and the Internet are clearly effecting immense changes in East Africa's economies (Graham 2015; Graham et al. 2015). Yet, our fieldwork has revealed little evidence to warrant

the proposition that increasing Internet connectivity alone is allowing economic actors to seamlessly transcend geographical distance. Our study has shown that the reality is more complicated, even for ICT-based sectors that are inherently based on bridging distance, such as BPO. The role of Internet connectivity for the growth of knowledge economies continues to be a complicated one, and much still needs to be done by policy-makers, businesses, and workers to adjust to the changes that it brings about.

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CHAPTER VIII

Key Messages and Way Forward

8.1 Key Messages

The digital revolution is altering the world in countless ways. As people and machines are progressively becoming more interconnected, the very fabric of societies is changing, with computer codes and algorithms increasingly determining what people should know, where they should shop, and who would be suitable for a relationship. However, while social media is bringing people across continents closer, the digital divide between and within countries is adding to persistent development gaps. As every revolution brings with it a possibility of changing the growth trajectories of a country, the digital revolution has also ushered in potential opportunities for developing countries to progress rapidly in their sustainable development goals. However, like every revolution, this revolution has also brought real dangers that countries and people will be left behind if they do not rapidly adjust to changing world realities.

In this context, the report provides an in-depth analysis of the potential opportunities offered by digitalization, especially in terms of progressing toward SDGs, while also examining the potential risks to development facing the Global South. Going forward, the digital economy has been identified as potentially the largest and most important opportunity for dynamic change in sustainable development, particularly for the Global South, however this can happen only if the associated risks are addressed effectively by state and non-state actors. The policies, at the national, regional and global levels, which can help the Global South to digitally progress have been discussed. South-South cooperation has been identified as a means, a method, and a series of tools with which developing countries can collaborate to enhance their opportunities and collectively face their challenges in the digital era.

The key messages emerging from different chapters of the study can be summarized as follows:

Defining Digital Economy and Digital Divide

Many definitions of digital economy have been put forward by different organizations, however given the ever-widening scope of digitalization, it is extremely challenging to arrive at a comprehensive definition of a digital economy. Twelve unique characteristics of digital economy are identified in the preceding chapters: the focus on creating content and knowledge; said knowledge is stored in a digital form; the possibility of converting

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physical items to virtual items; traditional structures give way to flexible work environments; the advent of deep, multi-level integration; disintermediation; the convergence between computing, communications, and content; it is based on innovation driven by ICT; it leads industry away from mass production and toward mass customization; the sense of immediacy by customers; globalization; and, some discordance or disinterest in sectoral and process disruption.

Based on these characteristics of a digital economy, the world can be divided into those who have access to digital technologies and have built their digital capacities and those who have not. The digital revolution was triggered in advanced countries, particularly in such countries as Germany, which has led to rapid emergence of a "Digital North", i.e., developed countries where people are simultaneously existing in both physical and digital spaces. Developing alongside the Digital North is the "Digital South", which refers to developing countries where people have relatively little engagement with digital technologies, if any at all. The digital divide between Digital North and Digital South is widening, nurtured by inter-dependent growth of digital technologies like big data analytics, 3D printing, artificial intelligence and the Internet of Things in the Digital North as compared to a lack of universal access to electricity and low Internet penetration rates in the Digital South. According to ITU (2019), 80.5 percent of the population in developed countries was using Internet in 2018, which given that the very young and old do not engage in Internet usage, is approaching saturation. Meanwhile the comparative Internet penetration rates were 45.3 per cent in developing countries and 19.5 percent in the least-developed countries.

A digital divide can also be seen within the Digital North, as the countries are divided between "Stand-Outs" which are highly advanced digitally and demonstrate a high degree of forward momentum and "Stall-Outs", and within the Digital South, as "Break-Outs", which are developing countries that score low in terms of digitalization but are growing and evolving quickly and can also be construed as "Watch-Outs". Yet, there are many countries that are not part of any of these groups and which therefore face the dangers of being pushed behind as the digital divide continues to widen.

Data: A New Factor of Production

Every revolution is based around a core resource. Coal, oil and gas formed the core resource for the first Industrial Revolution which ushered in mechanization; electricity was the core resource of second industrial revolution which led to mass production; and the third ICT revolution was based around Internet. At the heart of the fourth digital revolution is data. But unlike oil, gas and electricity, data is neither finite nor exclusive. Every single second, every person is creating data, which can be used at the same time by multiple users, without depleting it. This strength of data has made data an immensely valuable resource for humankind, which can generate "intelligence" that has the potential of changing the way people produce, consume, sell or buy. Data is penetrating into every activity,

thereby leading to new business models, new digital products, new ways of governing and monitoring, and new ways of innovating.

Data and the associated digitalized knowledge and information are the new factors of production along with capital, labour, energy, materials and services (KLEMS). Data can also "flow" at a speed much faster than the traditional factors of production. These characteristics of data, especially its non-exclusive nature and zero marginal cost, has led to the emergence of a new type of economy, which is a sharing economy or a platform economy.

New Development Opportunities Offered by Platforms but Limited Capacities in Developing Countries

The emergence of data and associated digitalized knowledge and information has given rise to a new form of business model i.e., "platforms", which are not constrained by boundary or scale but cut across sectors and operate simultaneously in different countries across continents. Platforms generate profits through "network effects"—more producers on the platforms attract more consumers which in turn attract more producers. Compared to traditional enterprises, digitalized platforms can achieve scale operations at faster speeds and lower costs and therefore it becomes difficult for traditional enterprises to compete with platforms.

Platforms have the potential to become a game-changer for Southern countries. Many businesses in the Global South lack access to customers in foreign markets and are restrained in scale due to limited demand. Platforms can provide access to foreign consumers at a minimal cost and thereby open new avenues. However, the development of platforms has progressed much more rapidly in advanced countries than in developing countries. Network effects have also led to the emergence of super platforms, which are few in number and concentrated in the Digital North. These platforms pose severe challenges to the producers and budding platforms in the Digital South. For example, many budding platforms in developing countries such as Flipkart—a national e-commerce platform in India—could not sustain competition from Amazon and was finally taken over by Walmart. But there are some successful examples, such as China's Alibaba, which offers services to 200 countries and regions and provides over 100 million kinds of products in 40 categories. Nonetheless, the imbalanced development of the Internet worldwide has contributed to the imbalanced development in the global platform economy, leaving most of the developing countries in a subordinate position in this regard.

Cross-Border E-Commerce Offers Unique Development Opportunities for the Global South, with the Digital Divide and Knowledge Gap Hindering Growth

The emergence of platforms has led to growth in cross border e-commerce, which is transforming traditional international trading patterns. Southern countries are emerging as important players, providing unique opportunities to small and medium-sized enterprises

to engage in international trade. After being initially dominated by large firms, this commerce model is opening up to small and medium-sized enterprises and start-ups. Many cross-border e-commerce platforms provide an opportunity for small and medium-sized enterprises to open stores online free of charge, thus enabling them to fully engage in international trade, without enduring the lengthy, complicated procedures of traditional trade. By significantly cutting transaction and communication costs, cross-border e-commerce has lowered the threshold for small and medium-sized enterprises to integrate into global value chains.

Nonetheless, aside from the logistics and other challenges faced by traditional trade, two unique challenges that are hindering the growth of cross border e-commerce in the Global South are the "first digital divide'" in terms of Internet penetration rates and the "second digital divide" in terms of the knowledge gap. The average Internet penetration rate in Africa is 35.2 percent, with less than 10 percent in countries such as Somalia, Niger, Madagascar, Burundi, Democratic Republic of the Congo, and Chad. Furthermore, the knowledge gap in the utilization of cross-border e-commerce between Southern countries remains a persistent problem, which affects the efficiency and quality of cross-border e-commerce transactions. The knowledge gap emerges from disparities in economic conditions, infrastructure, cultures, awareness levels, languages, rules and standards, despite similar Internet access conditions. This can lead to an augmented trust deficit, which can be detrimental to the growth of cross-border e-commerce.

Enhanced technological cooperation in the Global South and South-South investments can become important catalysts for the growth of cross border e-commerce. These factors can also help in diminishing the two digital divides. South-South investments are currently surging in this area as many e-commerce platforms in the South are receiving foreign investments from the South, with China emerging as a dominant investor.

For enhancing South-South technology transfers, cooperation in standards and rules within the Global South can play an important role. The ASEAN Work Programme on Electronic Commerce (2017-2025) is a good example of such a cooperation at the regional level. The ASEAN Agreement on E-commerce has standardized e-commerce rules for ASEAN member states, promoting digital connectivity and removing barriers for international e-commerce operations. It also aims to create a sound credit environment for e-commerce development and the facilitation of e-commerce transactions. Furthermore, the Asia-Pacific region has established a CPEA under the APEC mechanism to promote information sharing and cross-border privacy enforcement cooperation among data protection management organizations in APEC economies.

Digital Finance Offers Transformational Opportunities for the Global South but it Requires Strong Financial Infrastructure.

Cross-border e-commerce needs to be supported by digital finance. Digital finance—defined as financial services delivered by digital means, including mobile phones and the Internet—provides important opportunities for developing countries to boost economic development. By improving financial inclusion, digital finance can drastically cut costs to providers and enable governments to reach out to low-income sectors of society and those residing in less developed and remote areas. Furthermore, it can generate additional revenues for governments through improved efficiency. By enabling savings, digital finance can help stimulate financial markets in the Global South to attract more foreign investments, while also encouraging innovations and generating tremendous expansion possibilities for financial service providers as well as small businesses.

However, these gains from digital finance are not automatic and they require the development of a strong financial infrastructure. Governments can play a key role, especially in terms of putting in place balanced regulations for promoting fair competition. South-South cooperation can help developing countries build their digital infrastructure and promote digital financing.

Digital Financial Technologies Can Promote Financial Inclusion, But the Digital South Lacks the Prerequisites

Financial inclusion is an important enabler of 2030 SDGs, where it features as a target in eight of the seventeen goals. However, providing general financial services to micro and small enterprises and impoverished populations has always been a tremendous challenge around the world. Digital financial technologies, or fintech, offer a solution to this persisting problem. As many as 2 billion people worldwide are "unbanked", with a total credit gap at approximately USD 2.2 trillion.

The evolving financial technologies which can increase financial inclusion include mobile payments and digital banks or digital platforms, blockchain, smart technologies and AI. Digital platforms create two-sided markets for transactions, based on mobile phones or the Internet. They can be used for lending or for digital payments and transfers. Some successful examples of such platforms have emerged in developing countries. For example, Ant Financial, an online financial service, provides payment services, insurance, and loans to millions of rural micro and small enterprises, individual-owned businesses and farming households. M-Pesa is another successful example for the development of mobile payment in Sub-Saharan Africa.

Blockchain technology can make financial transactions quicker, cheaper, and more secure. It can also enable person-to-person lending on both a national and international scale, and blockchain-based platforms can be used for trade finance at a fraction of the cost and time involved when compared to traditional money-transfer systems. AI can help address core problems holding back financial inclusion, which extend to difficulties in verifying identities and a lack of traditional data for underwriting services to vulnerable populations.

A mobile phone can provide easy access to a digital wallet that could be used for all payment transactions, such as receiving remittances, wages and government subsidies, making purchases at stores, or paying utility bills and school fees. These technologies can therefore be particularly important for developing economies, enabling them to leapfrog in market architecture, successfully targeting vulnerable sections of the economy, especially women and people living in remote areas. It is estimated that, assuming safeguards are in place, wide adoption of digital finance could increase developing countries' GDP by 6 percent in 2025.

However, the prerequisites for promoting fintech are mobile connectivity and ownership, digital-payment infrastructure, and widely accepted personal IDs. These prerequisites are often missing in most of the developing countries, especially in poorer and rural areas where these digital technologies could be of great help in terms of financial inclusion. These areas continue to lack coverage or are limited to 2G coverage or have unreliable service due to power outages at base stations. Low population densities, lack of a dependable electrical supply, or tenuous security situations can further discourage wireless providers.

A digital payment infrastructure requires several elements including a robust digital-payment "backbone" that connects banks, telecom companies, and other players; a wide network of CICO. points; widespread POS terminals that accept digital payments so that customers can replace cash purchases with digital ones; mPOS technologies; and a widely accepted system of personal IDs. However, these elements are lagging in the Digital South. For example, one in five individuals in emerging economies today remains unregistered in their country, compared with one in ten in advanced economies. Even when people have an ID, it must be authenticated online or through another digital mechanism in order to register remotely for financial products. Furthermore, along with strong infrastructure countries also need a sustainable, competitive business environment that can support a broad range of participants in digital finance, which includes not only banks but also telecom companies, mobile-handset manufactures, fintech start-ups and other businesses, including retail.

Blockchain and Smart Contracts Can Boost Trade Facilitation in the Global South

Smart contracts, which execute automatically when certain conditions are met, are revolutionizing international trade and finance. Powered by blockchains, a kind of distributed ledger, they increase the efficiency speed and level of precision in financial payments and reduce international trade costs and fraud by bolstering transparency.

Blockchains can provide important support for the Global South's efforts in the area of trade facilitation. The digitalization of the process speeds up custom clearances and reduces the amount of documentation required to process transactions while also providing support to other administrative procedures. Blockchain-based platforms enable smart monitoring and oversight. Such platforms provide detailed information about regulatory compliance to all relevant parties involved in international trade.

However, Blockchain solutions can be more effective if they are combined with other technologies. Many economies in the Global South are characterized by a low level of dissemination of related technologies, thereby limiting the maximum potential of blockchain in international trade.

Smart Societies Can Help Global South Progress Toward SDGs

Digital technologies and digital intelligence are leading to the emergence of smart societies, which can be defined as societies where social services, governance and even social interactions are driven by intelligent, smart and networked technologies. While Northern nations are fast emerging as smart societies, Southern countries are lagging far behind. However, smart societies can play an important role in helping the Global South progress on some of its SDGs, especially with respect to sustainable cities and communities, good health and wellbeing, quality education, and preventing natural disasters.

Smart cities can provide augmented resource utilization, high productivity, improved management transparency, improved quality of life, increased liquidity and reduced service costs. Nonetheless, there are the associated challenges of possible cyberattacks and the corresponding risks to public service, collapse of large-scale energy systems, and data privacy problems. Smart cities need smart social governance to advance toward becoming smart societies. This should include providing smart social services in the diverse areas of education, health, public safety, urban management, transport management, resources and environment, disaster prevention and mitigation, thereby making these services more pro-poor and inclusive. While the need for smart societies is considerable, progress in this direction has been extremely slow in the Global South. The efforts of individual countries may not be enough and would require external support from other developing and developed countries.

8.2 The Way Forward in South-South Cooperation for Digital Transformation

The UN 2030 Sustainable Development Agenda (2030 Agenda) coincides with the digital revolution. New digital technologies and digital solutions are rapidly being used in different spheres of our society, which on one hand provides a golden opportunity for the Global South in terms of transformational growth, yet which, on the other hand, can actually decelerate growth in those developing and low-income countries which are unable to catch up with the rapidly digitalizing global economy. While these countries are still struggling to put in place their ICT infrastructure and increase Internet access for their populations, the digital revolution demands building digital infrastructure in order to be able to use rapidly emerging digital technologies. If these countries are unable to build their digital infrastructure, there are real dangers that many of them will be pushed behind in the digitally transforming global economy.

The need to support these countries in the digital era is stronger than ever before. By providing support to these less advanced countries, the global economy has the potential to deliver successfully on its 2030 Agenda with remarkable progress in the Global South. For this to happen, developing and low-income countries will need to be given support from other faster growing developing countries as well as from industrialized countries, where the digital revolution continues to expand exponentially. SSC and TrC can play a catalytic role in enabling the global economy to achieve its SDGs.

Technological revolutions are not born to be pro-poor and inclusive. Targeted policies and efforts will be needed at the national, regional and global level to domesticate the digital revolution in a way that no one will be left behind. The key messages emerging from this report also provide policy directions for using digitalization to enhance progress toward SDGs in the Global South. Some of the policies that can be identified in the area of SSC include:

South-South Cooperation for Digital Transformation: Policies at the National Level

It is important for the Southern countries to be cognizant of the interdependencies of their growth in the emerging digitalized global economy. Emerging economies have the potential to act as a digital growth pole for other smaller and low-income developing countries. This in turn will further boost growth in these larger developing countries, given the scale economies of digital technologies. However, this "win-win" for the developing world can be delivered only through stronger SSC. Policymakers should recognize the potential of SSC in the digital world and design national policies that can help this cooperation to progress toward productive integration.

Policies at the National Level Which Can Benefit from South-South Cooperation Include:

- *National Digital Industrial Policies.* In order to develop digital infrastructure, a country should design a comprehensive national digital industrial policy that can help its productive integration into the digital global economy. Digitalization is boosting productivity and efficiency in the Northern countries, which are increasing digital content in all stages of their production. Northern countries are using big data analytics and AI in the pre-production stage; robotics and Internet of Things in the production stage and e-commerce and digital technologies, such as drone deliveries, in the post-production stage. Higher value-added of digital services in manufacturing products increase the global competitiveness of these products. Southern countries also need to design national digital industrial policies in order to increase the digital content of their industrial production, so that they succeed in their industrialization efforts. SSC can provide important lessons in terms of designing digital industrial policies. For example, important lessons can be derived from the experience of China, which has risen from being at the lower-end of the global value chain to becoming a digital leader in the world. (Sun and Grimmes, 2018).

- *National Data Regulation Policies*. Data is at the heart of the digital revolution. Countries need to put in place appropriate data regulation policies that protect their sovereign rights over data. This will allow them to build their data infrastructure and digital skills. UNCTAD's Trade and Development Report (2018) discusses the way in which countries can design their data regulation policies, sharing the example of Rwanda's Data Revolution Policy (Government of Rwanda, 2018). Rwanda has adopted the principle of national data sovereignty whereby the country retains exclusive sovereign rights on its national data. In conformity with this principle, Rwanda is willing, under agreed terms and governed by Rwandan laws, to host its sovereign data in a cloud or collocated environment in data centres within national premises or outside of Rwanda. This will help Rwanda build its data infrastructure. South-South cooperation can provide countries with other successful examples. Countries can also decide to share their data with other developing countries in order to develop big data analytics which can benefit all the sharing countries and, given the scale economies involved, lower their costs of building data infrastructure.

- *National E-Commerce Platforms*. Given the rising importance of e-commerce in the global economy, Southern countries need to develop their national e-commerce platforms in order to link their small and medium-sized enterprises to international markets. South-South cooperation can go a long way in terms of helping countries in building their platform economies. Given the small size of many low-income and developing countries, sharing platforms can help their exporters access bigger markets and boost their share in international trade. However, it is important to have appropriate anti-competitive regulations at the national level in order to promote fair competition. Important lessons in this regard can come from South-South cooperation. For example, India has recently announced its national FDI e-commerce policy, which will help in promoting fair competition in India's fast-growing domestic e-commerce market. This policy can be shared with other developing countries (Government of India, 2018).

- *National Financial Infrastructure to promote Digital Finance*. Financial technologies like blockchain and digital payment require that countries build or bolster their financial infrastructure. However, many Southern countries lack the capacity to even set up this infrastructure. South-South investments in fintech can provide potentially gainful opportunities for all developing countries. Some emerging countries are rapidly expanding their financial infrastructure and given the scale economies involved would greatly benefit by investments in the financial infrastructure of other countries. South-South cooperation in this area can boost South-South economic integration and help less advanced developing countries in their transformative growth.

South-South Cooperation for Digital Transformation: Policies at the Regional Level

- *South-South Digital Cooperation at the Regional Level.* At the regional level, South-South digital cooperation can tremendously help countries to digitally develop and progress rapidly toward achieving transformational growth. UNCTAD proposes a 10-point South-South Digital Cooperation Agenda (Banga and Kozul-Wright, 2018) which outlines the ways in which regional blocks can progressively digitalize. This involves building a regional data economy, building regional cloud-computing infrastructure, strengthening regional broadband infrastructure, promoting regional e-commerce, promoting regional digital payments, progressing toward single digital regional market, sharing experiences on e-government, forging regional partnerships for building smart cities, promoting regional innovations and technologies, and building regional statistics for measuring levels of digitalization.

South-South cooperation in these areas, especially at the regional level, can provide an important way forward for Southern countries. For example, it can help Africa to regionally integrate and rapidly digitalize. Small African countries will need regional support to develop their digital and financial infrastructures to use digital technologies. The SADC has established SADC's Integrated Regional Electronic Settlement System (SIRESS). SIRESS is an electronic central payment system that facilitates cross-border trade in the SADC region and allows for SIRESS participating banks to facilitate financial flows and settle regional transactions within SADC countries on a gross basis and in real-time. This has increased efficiency and facilitated cross-border trade (OECD, 2017). Anti-competition strategies can be designed at the regional level to protect regional and national e-commerce platforms and boost fair competition. Given the economies of scale in digital infrastructure, as with cloud computing infrastructure, it will be much more advantageous for developing countries to cooperate in building this infrastructure.

- *South-South Regional Cooperation to build Smart Societies.* Southern countries face similar challenges when it comes to building smart societies, which go hand in hand with building smart cities. At the regional level, targeted policies need to be added to already existing regional integration agendas for building smart societies. Countries will need regional support in order to provide smart governance and smart social services in the areas of health, education, urbanization, and disaster management. Developing public e-services using digital technologies and sharing them within the region can be economically more sustainable than countries developing their own smart governance services. Digital start-ups can be encouraged to develop e-governance services for the region which can benefit all countries of the regional blocs.

- *The Role of Regional Development Banks.* Regional Development Banks can play an important role within the framework of the South-South cooperation to bolster digital advancement among member countries. A Digital Development Fund

can be set up at the regional level to provide support to digital initiatives at the national level. Countries can contribute to this fund, which can then fund digital initiatives at the regional level.

South-South and Triangular Cooperation for Digital Transformation

- *North-South Digital Technology transfers*. SSC can greatly benefit from the triangular cooperation with Northern countries in the digital arena. The Global South needs digital technology transfers from Northern countries in order to boost its digital growth. Technology spillovers from foreign direct investments have been very successful in the past industrial revolutions, when technologies involved in mechanization and automation were developed in the West and then transferred to the South through different channels such as joint ventures, licensing, franchising, and through technology transfer agreements. Digital technology transfers from Northern countries need to be promoted in the Global South, these should include targeted policies and strategies at the regional and national levels.

International Cooperation for Digital Transformation

- International cooperation is needed to implement digital technologies and digital services and to help countries progress in their SDGs. The Sustainable Development Goals Fund (SDG-F) is a multi-donor and multi-agency development cooperation mechanism created in 2014 by UNDP, on behalf of the UN system to support sustainable development activities through integrated and multidimensional joint programmes. This fund can be an important source for channeling resources and building digital capacities in the Southern countries. There is a need to identify SDGs which can be achieved faster with the support of digital technologies and services—such as health, education and urbanization—and allocate resources accordingly.

The fourth digital revolution has brought new opportunities for transformational growth to the Global South. However, these opportunities have also ushered in some formidable challenges. The global community will need to work closely in order to bridge the digital divide and help countries in the Global South achieve structural transformation on the back of the digital revolution. Coordinated policies are required at the national, regional and international levels. However, policy space needs to be preserved by the Global South in the international rule-making arena to ensure that these countries have a say in designing their own policies for digital industrialization.

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