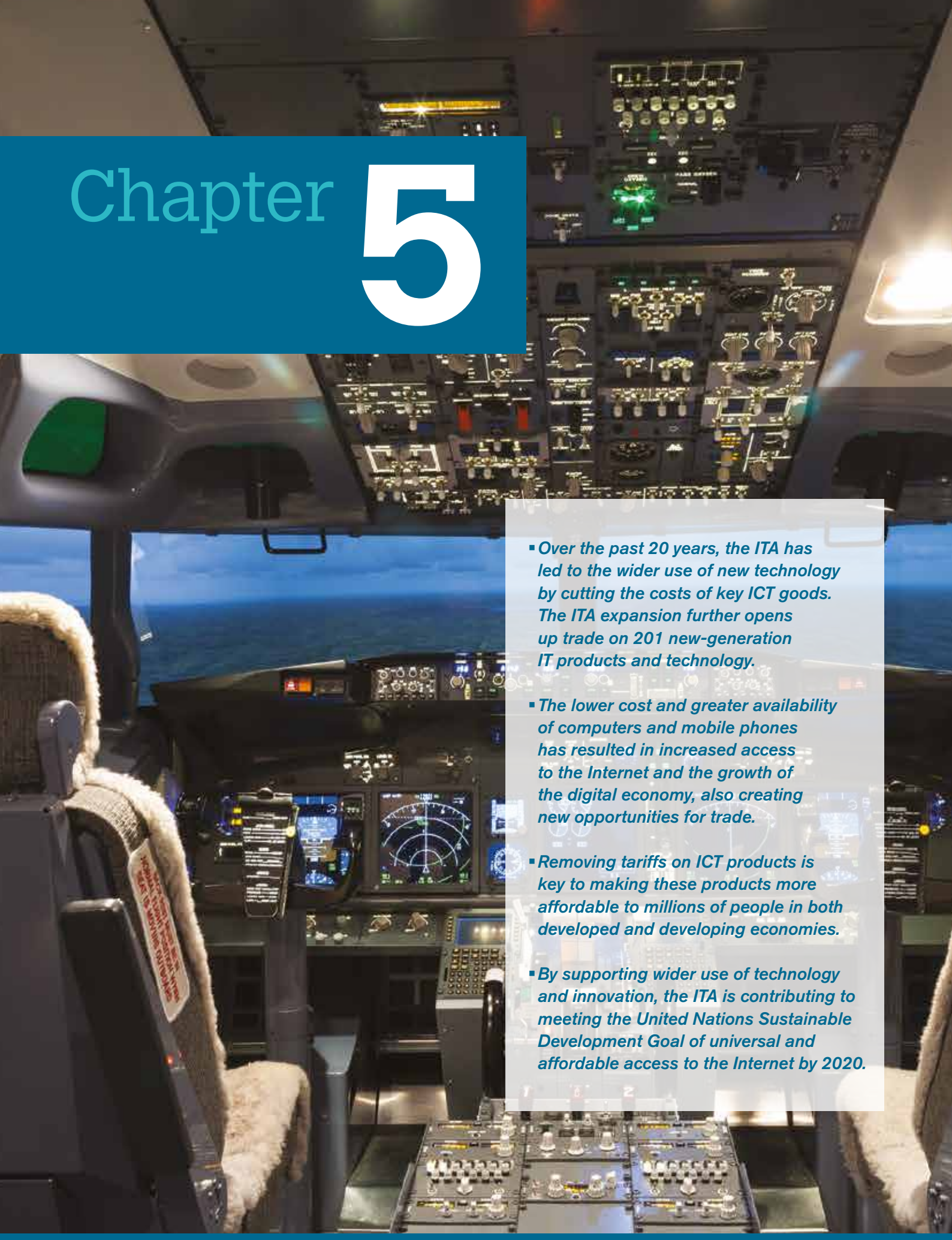
Chapter 5



- *Over the past 20 years, the ITA has led to the wider use of new technology by cutting the costs of key ICT goods. The ITA expansion further opens up trade on 201 new-generation IT products and technology.*
- *The lower cost and greater availability of computers and mobile phones has resulted in increased access to the Internet and the growth of the digital economy, also creating new opportunities for trade.*
- *Removing tariffs on ICT products is key to making these products more affordable to millions of people in both developed and developing economies.*
- *By supporting wider use of technology and innovation, the ITA is contributing to meeting the United Nations Sustainable Development Goal of universal and affordable access to the Internet by 2020.*

The ITA and the international digital economy

A. Introduction

The main objective of the Information Technology Agreement (ITA) has been to open up world trade in information and communications technology (ICT) products, to encourage the continued development of the ICT industry and to bring about greater access to high-tech products across the world. The ITA expansion continues that work by expanding the scope of access to over 200 new-generation ICT products, including products that were not covered or did not exist at the time of the first ITA.

Over the past 20 years, the 82 WTO members participating in the ITA have liberalized their trade in ICT products covered by the agreement through the reduction and elimination of customs duties and other charges. Currently about 88 per cent of world imports of ITA products are duty-free as a result of bound tariff commitments pursuant to the ITA. By reducing the cost of ICT, the ITA and the ITA expansion play a vital role in promoting affordable access to ICT and thus the adoption and use of technology. However, it is still difficult for many developing economies and least-developed countries (LDCs) to gain access to technology and innovation, also because in these economies the cost of ICT goods and services remains high, making technology unaffordable.

This chapter discusses how the ITA and the ITA expansion can contribute to significantly increasing access to and affordability of ICT goods and technology, by opening up untapped opportunities for developing economies and LDCs, who stand to benefit from ICT adoption and access to the Internet. The case studies presented in this chapter show how reducing the price of mobile phones, computers and other ICT inputs used for the improvement of network infrastructure can widen broadband adoption and thereby increase Internet usage, creating new opportunities for trade and development. This ties in with the fact that universal access to the Internet has been recognized as a development priority and has been set as a target under Goal 9.C of the United Nations Agenda for Sustainable Development (i.e. "Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least-developed economies by 2020"). Against this background, the role of the ITA and the ITA expansion in making ICT more affordable and facilitating universal access should be underscored.

Currently about 88 per cent of world imports of ITA products are duty-free.

B. The role of the ITA in the digital economy

Over the past 20 years, the ITA has played an important role in increasing global trade and investment in ICT, encouraging ICT adoption by cutting costs of ICT products. As shown in Chapter 2, in 2016, import prices of ICT goods such as computers and semiconductors were around 66 per cent lower than the corresponding level in 1996, while average import prices for capital goods were only about 25 per cent lower. [1]

The International Telecommunication Union (ITU) also reported that mobile-cellular prices continued to fall in 2015, and more steeply than in previous years: "For the first time, the average cost of the mobile-cellular basket (which includes 100 SMS and 30 mobile calls per month) in developing economies accounted for less than 5 per cent of GNI per capita. Least-developed countries (LDCs) saw a 20 per cent drop in mobile-cellular prices, the strongest decrease in five years". [2]

Removing tariffs on ICT products has made these products, and the potential of technology innovation associated with them, affordable to a growing number of people around the world. Similarly, the lower cost and widespread availability of computers and mobile phones has had a particular impact on access to the Internet and the growth of the digital economy and has created new opportunities for trade. [3]

In 2016, import prices of ICT goods such as computers and semiconductors were around 66 per cent lower than the corresponding level in 1996.

For example, the explosion of e-commerce would not have happened without innovations enabled by digital technologies. Internet-based platforms such as Amazon, Airbnb, Uber, Alibaba and eBay, led to new forms of trade, such as consumer-driven trade, which would have been inconceivable in the past. In 2016, Alibaba.com estimated that its business-to-consumers (B2C) e-commerce market would grow by a staggering 27 percent until 2020. However, business-to-business (B2B) e-commerce growth is far more significant than B2C e-commerce. According to UNCTAD's estimates, in 2015 e-commerce was valued at about US$ 25 trillion, of which more than US$ 22 trillion was represented by B2B e-commerce. [4]

A paper commissioned by the E15Initiative (a joint initiative by the International Centre for Trade and Sustainable Development (ICTSD) and the World Economic Forum) Expert Group on the Digital Economy suggests that the potential economic growth to be realized from liberalizing barriers to Internet access and digital trade is greater for the developing world, where a combination of growing young populations, rising incomes and urbanization should reduce the marginal cost of extending access to a wider population in the near future. [5]

As reported by Ezell and Wu (2017),

> *"throughout the developing world […] greater ICT usage supports higher sales, productivity, and even employment at the enterprise-level. In general, developing-country small- and medium-sized enterprises (SMEs) experience a 10 percent productivity boost from Internet usage. In Vietnam, firms using e-commerce enjoy total factor productivity growth 3.6 percentage points higher on average than firms that do not use it".*

Citing a World Bank survey, Ezell and Wu also note that:

> *"ICT-enabled firms in developing countries were twice as profitable, 65 percent more productive, and boosting employment 25 percent faster than firms that did not adopt ICTs. Likewise, a study of six West African countries found that approximately 40 percent of their increase in total factor productivity growth was attributable to ICT-related growth".*

In developing economies, mobile-phone enabled technology has already provided innovative solutions for business. Ezell (2012a) notes that "the proliferation of mobile communications/computing devices has bolstered the productivity, efficiency, and innovative capability of citizens and businesses, inspiring a wave of mobile-phone enabled innovations". To cite just one example, the award-winning Kenyan website/app M-Farm enables Kenyan farmers to use the SMS feature of their mobile phones to receive information relating to the real-time retail prices of their products and to find buyers for their produce. [6] In recognizing that mobile technologies have become platforms for innovation, the Information Technology and Innovation Foundation (ITIF) notes that the ITA has played an important role in furthering their diffusion throughout the developing world:

> *"whether it comes to computers, servers, mobile devices, or componentry for the data centers and telecommunications networks that underlie enterprises' ability to engage in e-commerce, create websites, or operate their businesses digitally, the ITA has played a key role in lowering prices for the ICT hardware, platforms, systems, and devices that underpin the digital revolution. In other words, the ITA supports the ICT hardware on which the global digital economy now runs".* [7]

C. Barriers to the adoption and use of technology

Despite the liberalization of trade in key ICT products brought by the ITA and the progress in the diffusion of technology over the past 20 years, a number of barriers to its adoption and use continue to exist. Studies have shown that raising the cost of access, for example through the application of tariffs to essential ICT products, necessarily limits a firm's ability to participate effectively in global trade. [8] In a world in which trade increasingly takes place within global value chains, market access is defined by a firm's capacity to communicate with other links in the production process, to add value through its contributions, and, increasingly, to innovate in collaboration with other participants in the value chain. Access to the Internet is fundamental to that process.

In such an interconnected world, the existence of barriers to trade, including traditional barriers such as tariffs, remain a significant obstacle to the access and adoption of ICT, hindering innovation and progress. As we have seen in Chapter 2, tariffs applied by non-ITA participants remain generally high, and can reach 45 per cent in some markets and on some products. [9] These figures are even higher for products covered by the ITA expansion, where import duties can be as high as 87 per cent in economies that are not parties to the agreement. Moreover, participation in the two agreements, which represent the primary vehicle for multilateral liberalization for the ICT sector, by developing economies and LDCs remains limited.

The link between cost/affordability of ICT goods and services with the use of Internet is illustrated in submissions to the OECD/WTO 2017 Aid for Trade monitoring and evaluation exercise, where it is shown that affordable access to the Internet weighs heavily on firms, consumers, custom officials and other border authorities and affects their ability to take advantage of the opportunities presented by e-commerce. In this context, the ITA and the ITA expansion have a role to play, as illustrated below.

D. Improving ICT affordability

Universal access and affordability of ICT and Internet services generally refers to availability (in terms of locality), accessibility (in relation to demography) and affordability (referring to cost, which is affected by technology, efficiency and rate of expansion). [10] Thus the cost of ICT is one of the main inhibitors of the adoption and use of technology.

With respect to affordability, the new edition of *Aid for Trade at a Glance 2017: Promoting trade, inclusiveness and connectivity for sustainable development*, to be published at the Global Review 2017, indicates that the cost of service is not the only price component to be considered in relation to mobile-broadband services, and that other factors such as the cost of a smartphone may be a decisive factor for future uptake. [11] Similarly, ITU (2016) notes that among the main barriers to mobile-phone ownership, the "cost of the handset" is still mentioned as the main barrier to owning a mobile phone. [12] According to the ITU, an average of 20 per cent of the population in developing economies still does not use mobile phones, and in some large developing economies the proportion of mobile phone ownership is even lower, affecting more than 40 per cent of the population. [13]

These data suggest that there is a need for developing economies and LDCs to cut the costs of ICT if they want to improve access to technology and unlock opportunities. In this context, participation in the ITA and the ITA expansion, which aims to reduce the cost of ICT products, such as computers, servers and mobile phones, could be a driver for reforms, as has been the case for some economies that have managed to achieve more affordable Internet access.

According to the 2017 Affordability Drivers Index (ADI) [14] developed by the Alliance for Affordable Internet, which looks at the policy and regulatory frameworks in place across 51 developing and emerging economies to determine what solutions are effectively expanding access to affordable broadband, four out of the top five economies with improved infrastructure and access to more affordable Internet – namely Colombia, Peru, Malaysia and Costa Rica – are all ITA participants. Colombia, Costa Rica and Malaysia are also participants to the ITA expansion.

In the case of Colombia, which has enjoyed the top ranking in the ADI for the past three consecutive years, Alliance for Affordable Internet (2017) notes that much of its success so far has been driven by government leadership in implementing effective policies and building partnerships within the ICT sector. These policies include better incentives for broadband adoption at all levels, such as elimination of customs tariffs and value-added tax on the purchase of personal computers, subsidies for computers and special subsidized tariffs for Internet access in low-income households. [15]

Alliance for Affordable Internet (2017) further highlights as one of the recommended actions to be undertaken by governments in developing and least-developed economies the reduction of the cost of mobile phones and ICT devices through the reform of tax and patent regimes in order for ICT device costs to come down. The importance of affordable Internet for developing economies is further highlighted in the case stories presented below (see Boxes 5.1 and 5.2).

An average of 20 per cent of the population in developing economies still does not use mobile phones.

BOX 5.1 Case stories on internet affordability: Ghana [16]

From a 2012 survey conducted in Ghana, it emerged that affordable broadband remains a dream for the majority of Ghana's 25 million inhabitants. Consumers said that their primary reason for not accessing the Internet was cost.

Back in 2005, Ghana adopted a National Telecoms Policy (2005 NTP) which sought to ensure universal access to telephone, Internet and multimedia services by 2010, and for national penetration of universal telecommunications services to reach 25 per cent of the population, including at least 10 per cent in rural areas, by the year 2010.

Implementation of the 2005 NTP has borne some fruit. For instance, between 2005 and the end of 2012, mobile penetration grew from 13.28 per cent to more than 100 per cent (however, it is estimated that there are about two SIM cards per subscriber in Ghana thus true universal telephony service is yet to be achieved). Ghana's access to international bandwidth has also increased thanks to liberalization and increased competition. Between 2010 and 2013, four fibre optic submarine cables were landed in Ghana, boosting the amount of international bandwidth from 320 Gigabytes to over 12 Terabytes.

However, the increase in international bandwidth and mobile phone penetration have not translated into widespread Internet access. 2012 ITU figures suggested that only 17.1 per cent of Ghanaians use the Internet. As in much of Sub-Saharan Africa, disparities between urban and rural areas in ICT ownership and usage also remain a challenge in Ghana. According to the 2010 Ghana census, only 47.8 per cent of Ghanaians own a mobile phone, and while 63.4 per cent of urban dwellers own phones, only 29.6 per cent of rural dwellers do. In respect to Internet usage, the difference between urban and rural users is even more pronounced. While 12.7 per cent of urban dwellers used the Internet in 2010, only 2.1 per cent of rural dwellers did.

The challenge of connecting all Ghanaians to broadband is multifaceted. Low ownership of devices such as tablets, laptops and personal computers is often cited as a barrier. Only 7.9 per cent of households own a laptop or computer. A lack of access to networks that facilitate a good, higher-speed Internet experience, such as 3G, LTE or fibre optic networks, was also a challenge. Lack of consumer demand, owing to limited local content and a relatively small number of local users with whom to interact, was also cited as a barrier.

However, the primary stumbling block is cost. Almost 60 per cent of Ghanaians said that the high cost of access prevented them from using the Internet. Broadband services in Ghana are relatively expensive and remain a luxury item for many Ghanaians. According to the ITU, a prepaid 500MB mobile handset mobile broadband package in Ghana costs 9 per cent of gross national income (GNI) per capita, almost double the UN's 5 per cent target, [17] causing Ghana to be ranked 96th out of 126 economies. In the 2017 ADI, Ghana ranked 26th due to the cost of broadband services, as these remain too expensive for most Ghanaians.

In response to these challenges, the Ministry of Communications of Ghana is in the process of finalizing a new broadband policy in which improving affordability is a key objective. The policy wants to ensure affordable access to broadband infrastructure for all Ghanaians and last mile connectivity to every home by 2020. Some specific government actions include prioritizing open access to the network, the creation of dedicated funds directly targeted at increasing broadband access and affordability, and the review of taxation on ICT, among other measures.

On taxation, Ghana's burden of taxation on the total cost of mobile phone ownership is more than 22 per cent, which is in stark contrast to Nigeria where only 5.4 per cent of the total cost of mobile ownership consists of taxes. In the draft broadband policy, the review of ICT taxation is a key objective of the government so as to achieve a more efficient tax regime and, as witnessed in other economies, encourage greater use of ICT, including broadband.

BOX 5.2 Case stories on internet affordability: Myanmar [18]

Once the least connected country in the world, Myanmar now has one of the world's fastest growing telecom markets. The change can largely be attributed to the liberalization of the ICT sector, consequent competition between service providers, and falls in the cost of connecting to both voice and Internet services.

In 2000, the cost of a SIM card in Myanmar (US$ 5,000) presented a significant a barrier to usage and few people could afford to subscribe to mobile services. Despite the falling cost of a SIM card during the last decade, the price remained an insurmountable barrier for many until 2014, when a potential mobile subscriber in Myanmar would have had to pay US$ 150 for a SIM card. The liberalization of the ICT sector contributed to a dramatic drop in the price of SIM cards, which today cost just US$ 1.50. With three-quarters of Myanmar's 51.4 million people not connected to any basic telecommunication services, the commercial opportunities for operators, as well as the socio-economic development opportunities for the population, are clear.

ICT use in Myanmar is also limited. In 2013, the fixed-line telephone penetration rate stood at 1 per cent, mobile penetration at 12.83 per cent, and Internet users at 1.2 per cent. While all of Myanmar's ICT connection

benchmarks are relatively low, it is perhaps the low number of Internet users that is most significant for those focused on leveraging ICT for development.

Evidence from other developing markets in Asia and farther afield indicates that mobile telephony can experience exponential growth given the right conditions. However, unlike the development of mobile voice telephony, in order for a similar explosion in Internet and broadband usage to occur, governments and other stakeholders must do much to stimulate both the supply of and demand for Internet and broadband services.

Challenges including limited user awareness, the high cost of smartphones and other devices, the limited availability of services, and the cost of services themselves, are all cited as barriers to increased access and all require action.

The Ministry of Communication and Information Technology of Myanmar has given mobile operators ambitious targets for the rollout of infrastructure and uptake of services. The mobile network population coverage is expected to grow from the current level of 12 per cent to 95 per cent by 2020 and the uptake of broadband Internet to at least 25 per cent by 2018.

E. The importance of connectivity for development

The liberalization of trade in ICT products under the ITA has contributed to the increased use of ICT products and technology, which has had a direct impact on innovation, productivity and growth. According to the ITIF, while the production of ICT goods and services is important for economies, the vast majority of economic benefits from technology – as much as 80 per cent – come from the widespread usage of such technology, while only approximately 20 per cent of the benefits of technology comes from its production. [19] Therefore, expanding access to and usage of Internet is key to unlocking the potential economic and social benefits deriving from it.

According to a study conducted by Deloitte for Facebook, [20] the positive effects of connectivity are potentially greater in developing economies than in developed economies due to the reduced quality of physical and administrative infrastructure that support the functioning of the markets. SMEs in developing economies are among the biggest winners from receiving access to the Internet, and extending internet connectivity is critical to accelerating economic and social growth in developing economies while enabling the transition from a resource-based to a knowledge-based economy.

However, connectivity remains limited for many developing and least-developed economies, where access to telecommunications and to the Internet occurs mainly through mobile technology. In contrast, in developed economies, Internet access is widespread and technological advancements have reduced the cost of access and increased the quality of connection. Consumers can enjoy a choice of fixed, Wi-Fi, and mobile technology and most of them are able to access high speed broadband. Ensuring the same level of connectivity in developed and developing economies could mean that long run productivity could be enhanced by as much as 25 per cent in developing economies. [21]

Indeed, mobile technology has seen unprecedented growth in developing economies, as, according to ITU (2016), the number of mobile cellular subscriptions has continued to grow at double digit rates, reaching a penetration rate of close to 41 per cent, covering about 3.6 billion people by the end of 2016. [22] The number of households with access to the Internet reached 1 billion across the world, of which 230 million are in China, 60 million in India, and 20 million in all the 48 LDCs. According to the ITU, in 2016, the proportion of the global population covered by a mobile-broadband network (3G or above, i.e. rendering larger data formats more accessible than with previous 2G networks)

Mobile technology has seen unprecedented growth in developing economies as the number of mobile cellular subscriptions has continued to grow at double digit rates, covering about 3.6 billion people by the end of 2016.

reached 84 per cent, but only 67 per cent of people living in rural areas were covered. Just over half of the global population (53 per cent) is covered by LTE ("Long Term Evolution", i.e. technology used to pursue 4G standards) or higher networks, enhancing the quality of Internet use, with only a small proportion living in rural areas.

However, while infrastructure development is crucial, high prices, poor quality of service and other barriers are serious obstacles to encouraging people to enter the digital world. [23] Besides the cost of ICT devices mentioned above, another reason for the limited uptake of Internet in the developing world is the price of broadband services, which are still unaffordable for poor segments of the global population. While the prices of fixed and mobile services continue to fall globally, the cost of mobile-broadband services still represent more than 5.5 per cent of GNI per capita worldwide. The average price of a basic fixed-broadband plan is more than twice as high as the average price of a comparable mobile-broadband plan. In LDCs, fixed-broadband services are on average more than three times as expensive as mobile-broadband services. According to World Bank (2016), "in Latin America, fewer than 1 in 10 poor households is connected to the internet. In the Central African Republic, one month of internet access costs more than 1.5 times the annual per capita income". [24] Income inequalities within economies are one of the reasons why broadband – in particular fixed broadband – remains unaffordable to large segments of the population. For these income groups, therefore mobile broadband represents a more affordable alternative. [25]

Against this scenario, the effects of the ITA and the ITA expansion on the costs of mobile phones and other devices connecting to the Internet can contribute to making access to the Internet more affordable and increasing connectivity. The potential economic and social impact deriving from Internet access and the role of technology in reducing poverty and promoting social inclusion have also been recognized by the United Nations, which have included universal and affordable access to the Internet as one of their Sustainable Development Goals.

F. The ITA facilitates implementation of the SDGs

In 2015, the United Nations adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs), with associated targets, which are a call for action to improve the lives of people everywhere. [26]

Several SDGs refer directly or indirectly to ICT and technology. In particular, SDG 9, "Build resilient infrastructure, promote sustainable industrialization and foster innovation", calls for increased access to ICT, working towards "universal and affordable access to the Internet in least developed countries by 2020" (see Box 5.3). The achievement of Goal 9 can be expected to have spill-over effects on other SDGs which can clearly benefit from innovation deriving from technological development and access to more affordable ICT goods and internet services, including but not limited to poverty reduction (Goal 1), quality education (Goal 4), clean energy (Goal 7), decent work and economic growth (Goal 8) and reduced inequalities (Goal 10). Guatemala's "Programa Valentina" presented in Chapter 1 describes some of these links. [27]

Under SDG 9, ICT is considered by the UN as "basic infrastructure", like roads, sanitation, electricity and water. As basic ICT infrastructure remains insufficient in many developing economies, one of the targets of SDG 9 (i.e. Target 9.C) focuses on the need to increase access to ICT and the Internet, as measured by the percentage of the population covered by different mobile technologies. The main objectives are to increase access to ICT significantly and to strive to provide universal and affordable access to the Internet in least-developed economies by 2020.

Making the Internet universally accessible and affordable is also key to closing the remaining digital divide between developed and developing economies – and particularly LDCs – as well as between different regions within individual economies. Figures from ITU (2016) show that close to one out of two (47 per cent) people in the

BOX 5.3 UN Sustainable Development Goal 9 – ICT-related targets

- "Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing states"
- "Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities"
- "Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020".

world are using the Internet, but only one out of seven people in LDCs. [28] According to World Bank (2016), the theme of which was digital dividends" (i.e. the broader development benefits that may result from using digital technologies), in Africa the richest 60 per cent of the population is almost three times more likely to have Internet access than the bottom 40 per cent, and the young and urban have more than twice the access of older and rural citizens. Among those connected, digital capabilities vary greatly. In the European Union, three times more citizens use online services in the richest economies than in the poorest, with a similar ratio of three to one between the rich and the poor within each economy.

World Bank (2016) also suggests that if digital technologies are to benefit everyone everywhere, it will be necessary to close the remaining digital divide, especially in Internet access. But greater digital adoption will not be enough. To get the most out of the digital revolution, economies also need to work on what the World Bank (2016) calls the "analogue complements" for a digital economy, [29] which are: a business environment where firms can leverage the internet to compete and innovate for the benefit of consumers; better and more responsive education and training to improve workers' skills to take advantages of the new economy and overcome the job displacement and job losses that can derive from technological change; and accountable institutions that effectively use the Internet to empower its citizens and deliver services.

In this context, participation in the ITA and the ITA expansion could be one of the drivers to the removal of barriers to Internet access and act as an important enabler for the diffusion and adoption of technology and innovation, which could contribute to helping achieve universal and affordable access to the Internet.

Endnotes

1 See Chapter 2.

2 See ITU (2016).

3 In economic and statistical analysis, the scope of what digital economy comprises may not be fully clear. However, it is certain that in the era of digitization, information and communication technology, especially the Internet, defines the characteristics of services innovation and provides new impetus to trade.

4 Source: http://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1466&Sitemap_x0020_Taxonomy=UNCTAD%20Home;#2149;#UNCTAD

5 See Ahmed and Aldonas (2015).

6 See Ezell (2012a), page 4.

7 See Ezell and Wu (2017), page 13.

8 See Ahmed and Aldonas (2015), page 4.

9 Ezell (2012a) notes that "[b]ecause ICT usage contributes greater benefits to economic growth, tariffs are particularly pernicious when applied to ICTs, hurting the nations that impose them by raising the cost of ICT goods and services, thus causing businesses (and individuals) to invest less in ICT, which lowers their productivity – and in the case of traded sectors – their competitiveness" (page 6).

10 See Milne (2006).

11 See the forthcoming WTO publication *Aid for Trade at a Glance 2017: Promoting trade, inclusiveness and connectivity for sustainable development.*

12 ITU (2016), page 11.

13 Idem.

14 Alliance for Affordable Internet (2017). The index is calculated using two separate scores: the first assesses infrastructure deployment and the policy and regulatory framework designed to facilitate it, and the second measures access in terms of the rate of adoption of broadband and the policy and regulations meant to promote access.

15 See Alliance for Affordable Internet (2016), page 15.

16 See OECD-WTO Aid for Trade monitoring exercise 2017, NGOs and Academia case story 3, http://www.oecd.org/aidfortrade/casestories/casestories-2017/CS-03-A4AI-Affordable-Internet-in-Ghana.pdf

17 According to the targets of the UN Broadband Commission for Digital Development, which in 2011 set the following target: "By 2015, entry-level broadband services should be made affordable in developing countries through adequate regulation and market forces (amounting to less than 5% of average monthly income)". As reported by the ITU in its "ICT facts and figures 2016" (https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2016.pdf), by the end of 2015, 83 developing economies and 5 LDCs had achieved the Broadband Commission's affordability target, but in the majority of the world's poorest economies, broadband was still unaffordable.

18 See OECD-WTO Aid for Trade monitoring exercise 2017, NGOs and Academia case story 5, http://www.oecd.org/aidfortrade/casestories/casestories-2017/CS%2005-A4AI-Affordable-Internet-in-Myanmar.pdf

19 See Ezell and Atkinson (2010).

20 See Deloitte LLP and Facebook Inc. (2014).

21 See Deloitte LLP and Facebook Inc. (2014).

22 See http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2016.pdf

23 See ITU (2016), page 13.

24 See World Bank (2016), page 16.

25 Looking in more detail at the effective usage of mobile phones, ITU (2016) shows that the number of Internet users remains well below the number of people with network access, with 3.9 billion people globally still offline.

26 http://www.un.org/sustainabledevelopment/sustainable-development-goals/

27 See page 17.

28 See http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2016.pdf

29 See World Bank (2016), page 29.

Appendix: Methodological challenges and assumptions

As mentioned in Chapter 2, a number of technical assumptions were made for the analysis of trade and tariff data of ITA products. This was also the case for the data used in the publication for the 15th Anniversary of the ITA.[1]

A. Definition of product categories

The ITA does not differentiate products in its coverage beyond Attachment A (with two sections) and Attachment B. Although there are many ways in which these products could be classified for analytical purposes, the Secretariat used the following seven categories: (1) computers and calculating machines; (2) telecommunication equipment; (3) semiconductors; (4) semiconductor manufacturing equipment; (5) data storage media and software provided on physical media; (6) instruments and apparatus; and (7) parts and accessories. It should be noted that the last category includes all parts and accessories of all products falling within the ITA – including parts and accessories of semiconductor manufacturing equipment. Grouping ITA products into categories is not an exact science, so the figures presented in the study should be interpreted with caution. Also, the different amendments to the HS impacted each of these categories differently, as explained below.

B. Amendments to the HS

The product coverage of the ITA was largely based on HS1996. However, since then the WCO introduced a series of amendments to the nomenclature (i.e. the HS2002, the HS2007, the HS2012, and lately the HS2017). The latest amendment that entered into force on 1 January 2017 was not taken into account in this publication.

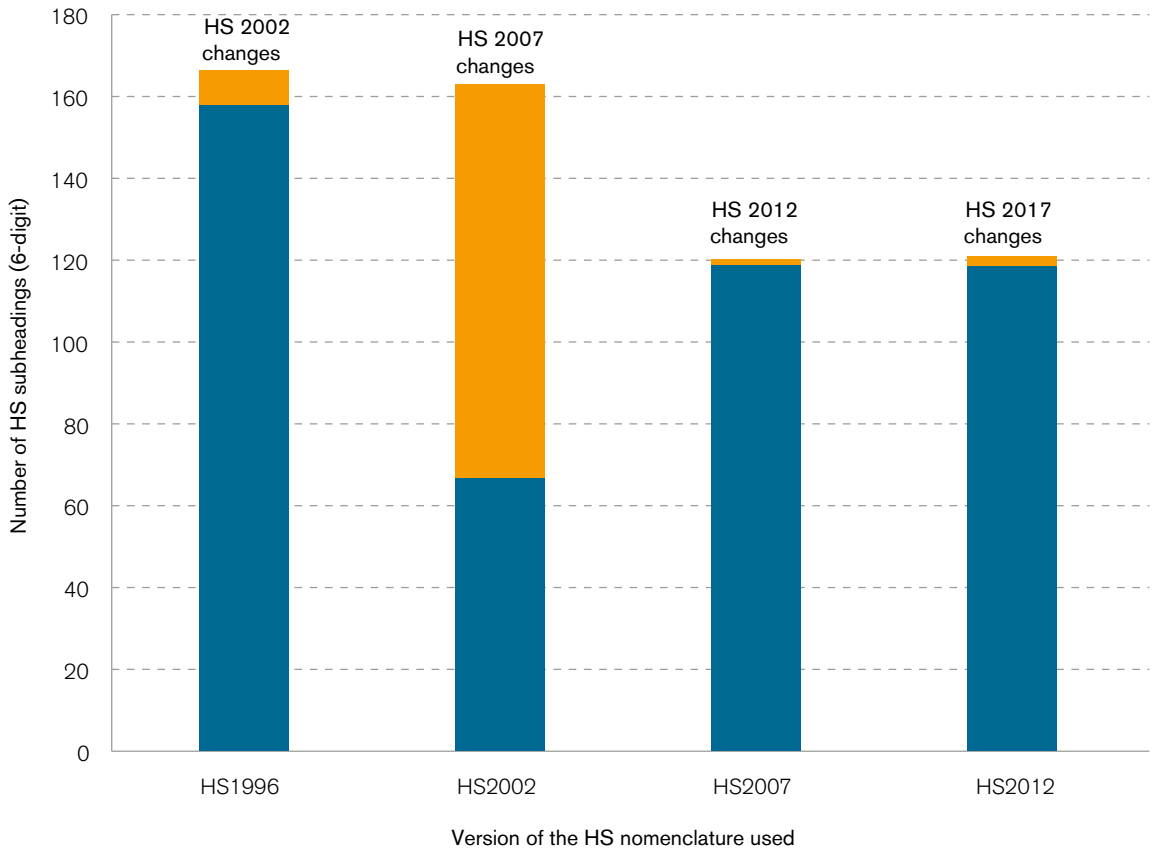
Not all HS amendments affected the subheadings covered by the ITA to the same degree. Figure A.1 shows that while HS2002 amendments only affected a handful of HS1996 subheadings, the introduction of HS2007 amendments was the most important, concerning 96 of the 163 HS2002 subheadings. Indeed, one of the major amendments to the HS in 2007 related to ITA products. More than half of the subheadings affected concerned semiconductor manufacturing equipment (29 subheadings) and parts and accessories (28 subheadings). Based on the indicative correlation tables between highlighting the changes from one nomenclature to the other,[2] it would appear that the HS2012 would only have a marginal impact on the classification of ITA products expressed in the HS2007 nomenclature. Similarly, the introduction of the HS2017 would also affect only two subheadings covered by the ITA (HS 852341 and 852349).

C. Partial coverage of HS subheadings

The product coverage of Attachment A of the Annex to the ITA is defined based on the 1996 version of the HS, and 95 of these 190 items were defined beyond the HS subheading (i.e. 6-digit) level. The use of specific subcategories within a subheading was identified by adding an "ex" next to the relevant code – the so-called "ex-outs". Of the 155 distinct HS1996 subheadings listed, 60 provide for one or more ex-outs (e.g. nine different ITA items are listed as ex-outs of HS1996 subheading 8479.89). Contracting parties to the HS can, but are not obliged to, create subdivisions of HS subheadings in their national or regional nomenclatures (i.e. at the 8-digit level or higher). Reasons for introducing national subdivisions vary widely and include imposing different tariffs. Cognizant of this fact, Paragraph 2 of the Annex to the ITA provides that "each participant shall promptly modify its *national tariff schedule* to reflect the modifications it has proposed [to its WTO schedule], as soon as they have entered into effect" (emphasis added). This does not mean, however, that all participants identified all ITA items at the national or regional level – a situation that considerably complicates a cross-country comparison and analysis of trade and MFN applied tariffs.

To further complicate calculations, some participants tend to use the same tariff code with a different product description over the years, making cross-year comparisons labour intensive. Another particularly difficult, but common, situation faced in the analysis of the data was how to treat situations where an ITA item

Figure A.1: Effect of HS amendments on subheadings covered by the ITA



Source: WTO Secretariat.

encompasses one or two different product subcategories within an HS subheading, including products not covered by the Agreement, but the participant does not differentiate them in their national nomenclature.

To find a solution to these problems, the Secretariat implemented a mixed approach whereby it defined a list of HS1996 subheadings that includes all the fully covered subheadings plus some of those with ex-outs. The same approach was used to define another list of HS2007 subheadings. The Secretariat estimates that this approach leads to a significant underestimation. Thus, while the approach chosen for this study is certainly not perfect, it yields a considerably more accurate picture of world trade in IT products.[3]

D. Attachment B items

Another major problem that complicated a trade and tariff analysis of ITA products was the divergence in the classification of the 55 Attachment B items. As explained in Chapter 3, the ITA Committee adopted two decisions: the first decision concerned the common classification of 18 Attachment B items in HS1996 and the second concerned the classification of 15 items in HS2007.[4] Therefore, out of the original 55 items, only 22 Attachment B items remain without a common HS classification by all ITA participants. The majority of these relate to parts and accessories of ITA products, most of which include semiconductor manufacturing equipment and their parts.

While the two decisions of the ITA Committee have helped to simplify the calculations, the problem remained for those items 22 Attachment items without a HS common classification. One possible approach to deal with this situation was to examine the individual commitments made in each of the relevant WTO schedules of concessions and the national tariff schedules involved. While this approach was used in this publication to calculate the exact average bound tariffs, it was considered to be a

cumbersome approach with respect to most-favoured-nation (MFN) applied tariffs and trade figures, mainly because it would have involved preparing detailed correlation tables from one HS nomenclature to another for the schedule of each ITA participant in order to keep track of the changes affecting ITA products. For this reason a "first model list" was developed with a total of 166 subheadings in the HS1996 nomenclature – 95 of which are fully covered and 71 have partial coverage.[5]

While the use of a model list in HS1996 considerably simplified the analysis, the approach may well lead to apparently inconsistent results when comparing the information in the WTO schedules and the applied tariffs. For example, there are cases where an HS subheading is covered by the first model list, but the ITA participant shows dutiable applied rates for all national tariff lines breakdown within the subheading. Whether or not the participant is in breach of the relevant concession depends, *inter alia,* on whether or not that subheading was included in the participant's schedule of concessions and if so, the manner in which it was reflected therein. Such comparison is further complicated because most WTO schedules of concessions are in an earlier HS version as compared to the most recent applied tariffs and trade data. In general, latest available applied tariffs and the corresponding trade statistics used in this publication are based on the HS 2012 version.

Endnotes

1 See WTO (2012), page 96.

2 The correlation tables constitute a guide published by the WTO Secretariat and their sole purpose is to facilitate implementation of the Harmonized System. See WTO official documents G/MA/W/105 and G/MA/W/122.

3 See WTO (2012), page 98.

4 See official WTO documents G/IT/27 and G/IT/29. More information is provided in Chapter 3.

5 WTO internal document JOB(07)/96.

Bibliography

Ahmed, U. and G. Aldonas (2015), "Addressing barriers to digital trade". E15Initiative. Geneva: International Centre for Trade and Sustainable Development (ICTSD) and World Economic Forum. Accessible at: www.e15initiative.org/www.e15initiative.org/

Alliance for Affordable Internet (2017), 2017 *Affordability Report,* Alliance for Affordable Internet. Available at http://a4ai.org/affordability-report/report/2017/

Alliance for Affordable Internet (2016), The 2015-16 *Affordability Report,* Alliance for Affordable Internet. Available at http://a4ai.org/affordability-report/report/2015/

Atkinson, R. D. et al. (2010), "The Internet Economy 25 Years After.com: Transforming Life and Commerce", Washington, D.C.: The Information Technology and Innovation Foundation (ITIF). Accessible at: http://www.itif.org/files/2010-25-years.pdf

Atkinson, R. D. and D. Castro (2008), "Digital Quality of Life: Understanding the Benefits of the IT Revolution", Washington, D.C.: The Information Technology and Innovation Foundation (ITIF). Accessible at: https://itif.org/publications/2008/10/01/digital-quality-life-understanding-benefits-it-revolution

Deloitte LLP and Facebook Inc. (2014), "Value of Connectivity: Economic and Social Benefits of Expanding Internet Access". Available at: https://www2.deloitte.com/content/dam/Deloitte/ie/Documents/TechnologyMediaCommunications/2014_uk_tmt_value_of_connectivity_deloitte_ireland.pdf

Ernst, D. (2013), "Is the Information Technology Agreement facilitating latecomer manufacturing and innovation? India's experience", East-West Center Working Papers

Ernst, D. (2014), "The Information Technology Agreement, Industrial Development and Innovation: India's and China's Diverse Experiences", E15 Expert Group on Trade and Innovation.

European Commission (2016), "The Expansion of the Information Technology Agreement: An Economic Assessment", Luxembourg: European Commission. Available at: http://trade.ec.europa.eu/doclib/docs/2016/april/tradoc_154430.pdf

Ezell, S. J. (2012a), "The Benefits of ITA Expansion for Developing Countries", Washington, D.C.: The Information Technology and Innovation Foundation (ITIF). Accessible at: http://www2.itif.org/2012-benefits-ita-developing-countries.pdf

Ezell, S. J. (2012b), "Boosting Exports, Jobs, and Economic Growth by Expanding the ITA", Washington, D.C.: The Information Technology and Innovation Foundation (ITIF). Accessible at: http://www2.itif.org/2012-boosting-exports-jobs-expanding-ita.pdf

Ezell, S. J. and R. D. Atkinson (2010), " The Good, The Bad, and The Ugly (and The Self-Destructive) of Innovation Policy: A Policymaker's Guide to Crafting Effective Innovation Policy", Washington, D.C.: The Information Technology and Innovation Foundation (ITIF). Accessible at: http://www.innovationmanagement.se/wp-content/uploads/2011/03/2010-good-bad-ugly.pdf

Ezell, S. J. and J. J. Wu (2017), "How Joining the Information Technology Agreement Spurs Growth in Developing Nations", Washington, D.C.: The Information Technology and Innovation Foundation (ITIF). Accessible at: https://itif.org/publications/2017/05/22/how-joining-information-technology-agreement-spurs-growth-developing-nations

Henn, C. and A. Gnutzmann-Mkrtchyan (2015), "The Layers of the IT Agreement's Trade Impact", WTO Working Paper ERSD-2015-01, Geneva: WTO.

International Telecommunication Union (ITU) (2016), "Measuring the Information Society Report 2016", Geneva: ITU. Available at: http://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2016/MISR2016-w4.pdf

Milne, C (2006), "Improving Affordability of Telecommunications: Cross-Fertilisation between the Developed and the Developing World", Texas: TPRC Conference. Available at: https://ssrn.com/abstract=2104397

OECD (2015), OECD Digital Economy Outlook 2015, Paris: OECD. Accessible at: http://www.oecd.org/sti/oecd-digital-economy-outlook-2015-9789264232440-en.htm
OECD and WTO (2017), *Aid for Trade at a Glance 2017: Promoting trade, inclusiveness and connectivity for sustainable development,* Paris/Geneva: OECD/WTO.

United States International Trade Commission (USITC) (2012), *The Information Technology Agreement Advice and Information on the Proposed Expansion:* Part 1, Washington, D.C.: USITC. Accessible at: https://www.usitc.gov/publications/332/pub4355.pdf

World Bank (2016), *World Development Report 2016: Digital Dividends,* Washington, D.C.: World Bank. Accessible at: http://www.worldbank.org/en/publication/wdr2016

World Trade Organization (WTO) (2012), *15 Years of the Information Technology Agreement: Trade, innovation and global production networks,* Geneva: WTO. Accessible at: https://www.wto.org/english/res_e/publications_e/ita15years_2012_e.htm

World Trade Organization (WTO) (2014), *World Trade Report – Trade and Development: Recent Trends and the Role of the WTO, Geneva: WTO.* Accessible at: https://www.wto.org/english/res_e/reser_e/wtr_e.htm

ITA: List of participants
(as of 19 May 2017)

The ITA currently has 53 participants representing 82 WTO members. The European Union is counted as one, as is the customs union between Switzerland and Liechtenstein.

Participant	Date of participation
Afghanistan	19 March 2014
Albania	28 September 1999
Australia	26 March 1997
Bahrain, Kingdom of	16 July 2003
Canada	26 March 1997
China	24 April 2003
Colombia	27 March 2012
Costa Rica	26 March 1997
Dominican Republic	7 July 2006
Egypt	24 April 2003
El Salvador	20 May 1997
European Union	26 March 1997
Austria	*26 March 1997*
Belgium	*26 March 1997*
Bulgaria	*1 January 2007*
Croatia	*28 September 1999*
Cyprus	*3 October 2000*
Czech Republic	*26 March 1997*
Denmark	*26 March 1997*
Estonia	*26 March 1997*
Finland	*26 March 1997*
France	*26 March 1997*
Germany	*26 March 1997*
Greece	*26 March 1997*
Hungary	*1 May 2004*
Ireland	*26 March 1997*
Italy	*26 March 1997*
Latvia	*24 February 1999*
Lithuania	*6 July 1999*
Luxembourg	*26 March 1997*
Malta	*1 May 2004*
Netherlands	*26 March 1997*
Poland	*26 March 1997*
Portugal	*26 March 1997*
Romania	*26 March 1997*
Slovak Republic	*26 March 1997*
Slovenia	*14 June 2000*
Spain	*26 March 1997*
Sweden	*26 March 1997*
United Kingdom	*26 March 1997*

Participant	Date of participation
Georgia	28 September 1999
Guatemala	22 December 2005
Honduras	20 October 2005
Hong Kong, China	26 March 1997
Iceland	26 March 1997
India	26 March 1997
Indonesia	26 March 1997
Israel	26 March 1997
Japan	26 March 1997
Jordan	17 December 1999
Kazakhstan	27 July 2015
Korea, Republic of	26 March 1997
Kuwait, State of	13 September 2010
Kyrgyz Republic	24 February 1999
Macao, China	26 March 1997
Malaysia	26 March 1997
Mauritius	6 July 1999
Moldova, Republic of	29 November 2001
Montenegro	9 July 2012
Morocco	14 November 2003
New Zealand	26 March 1997
Nicaragua	20 October 2005
Norway	26 March 1997
Oman	22 November 2000
Panama	23 June 1998
Peru	13 November 2008
Philippines	25 April 1997
Qatar	3 July 2013
Russian Federation	13 September 2013
Saudi Arabia, Kingdom of	20 October 2005
Seychelles	17 October 2014
Singapore	26 March 1997
Switzerland-Liechtenstein	26 March 1997
Chinese Taipei	26 March 1997
Tajikistan	2 March 2013
Thailand	26 March 1997
Turkey	26 March 1997
Ukraine	24 January 2008
United Arab Emirates	10 March 2007
United States	26 March 1997
Viet Nam	6 September 2006

Notes: In 1997, when the European Union became an ITA Participant, it had 15 member states: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom. The following economies joined the ITA individually in 1997: Czech Republic, Estonia, Poland, Romania and Slovak Republic. Bulgaria, Croatia, Cyprus, Latvia, Lithuania and Slovenia joined in or after 1998. Hungary and Malta joined the ITA through the EU enlargement in 2004.

Abbreviations

ADI	Affordability Drivers Index
APEC	Asia-Pacific Economic Cooperation
APTA	Asia-Pacific Trade Agreement
ASEAN	Association of Southeast Asian Nations
B2B	Business-to-business
B2C	Business-to-consumers
BASIS	Bangladesh Association of Software and Information Services
BEC	United Nations Classification by Broad Economic Categories
BPO	Business process outsourcing
CET	Common External Tariff
CTS	WTO Consolidated Tariff Schedules
EAC	East African Community
EACU	Eurasian Customs Union
ECOWAS	Economic Community of West African States
EMC	Electromagnetic compatibility
EMI	Electromagnetic Interference
FTA	Free trade agreement
GATT	General Agreement on Tariffs and Trade
GCC	Gulf Cooperation Council
GNI	Gross national income
GVC	Global value chain
HS	Harmonized System
IBPAP	Information Technology and Business Process Association of the Philippines
ICT	Information and communications technology
ICTSD	International Centre for Trade and Sustainable Development
IDB	Inter-American Development Bank
IEC	International Electrotechnical Commission
IECEE	IEC System of Conformity Assessment Schemes for Electrotechical Equipment and Components
ISIC	International Standard Industrial Classification
IT	Information technology
ITA	Information Technology Agreement
ITC	International Trade Centre
ITI	Information Technology Industry Council
ITIF	Information Technology and Innovation Foundation
ITU	International Telecommunication Union
JEIDA	Japanese Electronic Industry Development Association
KITOS	Kenya IT and Outsourcing Service
LED	Light-emitting diode
LDC	Least-developed country
LTE	"Long Term Evolution" technology
MCO	Multi-component integrated circuit
MCP	Multi-chip integrated circuit
MFN	Most-favoured nation
MOS	Metal oxide semiconductors
NAFTA	North American Free Trade Agreement
NAMA	Non-agriculture market access
NES	not elsewhere specified
NTMs	Non-tariff measures
NTBs	non-tariff barriers
NTP	Ghana's National Telecoms Policy
OECD	Organisation for Economic Co-operation and Development
OPTIC	L'Organisation des Professionnels des TIC du Sénégal
OTAM	Outsourcing and Telecommunications Association of Mauritius
PT	Preferential tariff
QR Code	Quick Response Code
SAFTA	South Asian Free Trade Area
SDGs	UN Sustainable Development Goals
SDoC	Supplier's declaration of conformity
SME	Small and medium-sized economy
TiVA	Trade in value added
TV	Television
TWG	Technical Working Group
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
VINASA	Vietnam Software Association
WCO	World Customs Organization
WTO	World Trade Organization

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20 Years of the Information Technology Agreement

Over the past 20 years, the Information Technology Agreement (ITA) has increased worldwide access to high-tech goods, such as computers, mobile phones and semiconductors. It has also contributed to greater access to the Internet and the growth of the digital economy, creating new opportunities for businesses and individuals in both developed and developing economies.

Finalized at the first WTO Ministerial Conference in 1996, the ITA commits its participants to eliminating tariffs on a wide range of IT products with an annual value of approximately US$ 1.7 trillion. To mark the 20th anniversary of the ITA, this publication analyses the impact of the ITA on its participants and on worldwide trade in IT products. It demonstrates how the Agreement has not only made high-tech products more affordable but has also helped to promote innovation and to support developing economies' integration into global production networks.

The publication also reviews new developments, such as the landmark deal concluded in 2015 to eliminate tariffs on an additional 201 IT products valued at over $1.3 trillion per year. Finally, it highlights what still needs to be done to meet the UN's Sustainable Development Goal of providing universal and affordable access to the Internet so that the benefits of the digital revolution can be enjoyed by all.

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