

Baker, Paul R.; Le, Loan

**Working Paper**

## Promoting sustainable development through digital trade and digital trade policies

ARTNeT Working Paper Series, No. 229

**Provided in Cooperation with:**

Asia-Pacific Research and Training Network on Trade (ARTNeT), Bangkok

*Suggested Citation:* Baker, Paul R.; Le, Loan (2023) : Promoting sustainable development through digital trade and digital trade policies, ARTNeT Working Paper Series, No. 229, Asia-Pacific Research and Training Network on Trade (ARTNeT), Bangkok,  
<https://hdl.handle.net/20.500.12870/6640>

This Version is available at:

<https://hdl.handle.net/10419/301132>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



## Promoting Sustainable Development Through Digital Trade and Digital Trade Policies



**Paul R. Baker**  
**Loan Le**

ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

# Working Paper

No. 229 | 2023

The Asia-Pacific Research and Training Network on Trade (ARTNeT) is an open regional network of research and academic institutions specializing in international trade policy and facilitation issues. ESCAP, WTO and UNCTAD, as key core network partners, and a number of bilateral development partners, provide substantive and/or financial support to the network. The Trade, Investment and Innovation Division of ESCAP, the regional branch of the United Nations for Asia and the Pacific, provides the Secretariat of the network and a direct regional link to trade policymakers and other international organizations.

The ARTNeT Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about trade issues. An objective of the series is to publish the findings quickly, even if the presentations are less than fully polished. ARTNeT Working Papers are available online at <http://artnet.unescap.org>. All material in the Working Papers may be freely quoted or reprinted, but acknowledgment is requested together with a copy of the publication containing the quotation or reprint. The use of the Working Papers for any commercial purpose, including resale, is prohibited.

**Disclaimer:**

This paper is a background paper prepared for the Asia-Pacific Trade and Investment Report (APTIR) 2023/24: Unleashing Digital Trade and Investment for Sustainable Development.

The designations employed and the presentation of the material in this Working Paper do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries. Where the designation “country or area” appears, it covers countries, territories, cities or areas. Bibliographical and other references have, wherever possible, been verified. The United Nations bears no responsibility for the availability or functioning of URLs. The views expressed in this publication are those of the author(s) and do not necessarily reflect the views of the United Nations. The opinions, figures and estimates set forth in this publication are the responsibility of the author(s) and should not necessarily be considered as reflecting the views or carrying the endorsement of the United Nations. Any errors are the responsibility of the author(s). The mention of firm names and commercial products does not imply the endorsement of the United Nations.



ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

# WORKING PAPER

## **Promoting Sustainable Development Through Digital Trade and Digital Trade Policies**

Paul R. Baker<sup>1</sup> and Loan Le<sup>2</sup>

### **Please cite this paper as:**

Paul R. Baker and Loan Le (2023). “Promoting Sustainable Development Through Digital Trade and Digital Trade Policies”, **ARTNeT Working Paper Series** No. 229, December 2023, Bangkok, ESCAP.

**Available at** <https://artnet.unescap.org/index.php/publications/working-papers/promoting-sustainable-development-through-digital-trade-and-digital>

### **Acknowledgement:**

This paper serves as a background paper for the Asia-Pacific Trade and Investment Report (APTIR) 2023/24, titled 'Unleashing Digital Trade and Investment for Sustainable Development', which is available at <https://www.unescap.org/kp/APTIR2023>. We thank Akshay Bholee of the IEC for his research assistance, particularly in data analysis and parameterization. We extend our gratitude to the UNESCAP team, comprising Yann Duval, Witada Anukoonwattaka, and Natnicha Sutthivana, for their invaluable feedback and contributions in finalizing this working paper.

---

<sup>1</sup> Corresponding author (baker@tradeeconomics.com). Paul Baker is the founder and CEO of International Economics Consulting Ltd.

<sup>2</sup> International Economics Consulting Ltd.

## **Abstract**

This paper examines the role of digital trade policy in promoting sustainable development. It starts from the conceptual framework of digital trade, as well as the interplay between digital transformation and the roles of trade and investment as means to achieving the Sustainable Development Goals (SDGs). This is supported by examination of the growth in digital trade, with special attention to Developing Countries (DCs) and Least Developed Countries (LDCs), and broad inferences regarding the implications for more inclusive and sustainable development. Drawing from the analysis on the pathways linking digital trade and SDGs, the paper identifies policy measures that could help unleash the benefits of digital trade across different sectors with respect to sustainable development. These include digital trade facilitation measures that may be taken to reduce the environmental impact of trade procedures and to enhance digital trade opportunities for women and Micro, Small and Medium Enterprises (MSMEs).

**Keywords:** Sustainable development, SDGs, digital trade, trade policies, trade facilitation

**JEL Codes:** F10, F13, Q01

## Table of Contents

<b>Abstract.....</b>	<b>iv</b>
<b>1. Framework Introduction .....</b>	<b>1</b>
<b>2. Digital Trade – A Theoretical Framework.....</b>	<b>3</b>
<b>3. The Nexus between Digital Trade Policy and Sustainable Development .....</b>	<b>4</b>
<b>4. Unintended Externalities of Digital Trade .....</b>	<b>15</b>
<b>5. Toward an Inclusive and Sustainable Digital Trade Policy Framework.....</b>	<b>17</b>
<b>6. Conclusion and Policy Implications .....</b>	<b>21</b>
<b>List of references .....</b>	<b>23</b>
<b>Annex 1: Econometric estimation of the contribution of DDS on SDG .....</b>	<b>28</b>

## List of tables

Table 1: Internet activities undertaken by individuals, by level of development and region (percent).....	9
Table 2: Sustainability related provisions in digital trade agreements/chapters.....	20

## List of figures

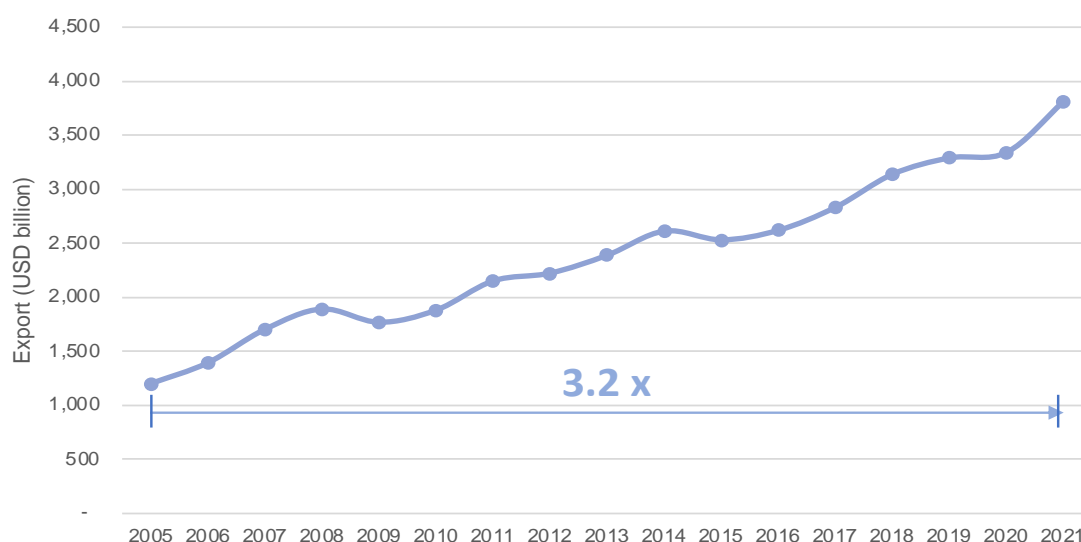
Figure 1: Global exports of digitally-deliverable services, 2005-2021.....	1
Figure 2: Digital trade and potential pathways to reach SDGs .....	11
Figure 3: Digitally-deliverable services trade vs. Export share by DCs and LDCs .....	13
Figure 4: Digitally-deliverable services trade vs GDP per capita .....	14
Figure 5: B2C e-commerce index vs GDP per capita (PPP) (2020) .....	14

## 1. Framework Introduction

Digital trade has become a dynamic driver in the global economy as evidenced in its growth and the role it plays in supporting trade resilience during the recent COVID-19 pandemic. Measuring digital trade remains a daunting task for any international organisations as well as national statistics agencies. However, available data can be used as a proxy to indicate the size, or a portion thereof, of digital trade and the larger digital economy. In terms of e-commerce merchandise volume (the digitally ordered trade portion of digital trade), UNCTAD estimates that global e-commerce sales amounted to \$26.7 trillion globally in 2019, with B2B e-commerce representing 82% of all e-commerce (UNCTAD, 2021). The COVID-19 pandemic has undoubtedly altered shopping behaviour from offline to online (UNCTAD, 2021). While the data for e-commerce gross merchandise volume (GMV) for 2020 onward is not yet available, it is estimated that online retail sales as a share of total retail sales jumped by 3 percentage points during the 2019-2020 period (UNCTAD, 2021).

Trade in digitally-delivered services has also been increasing over the years, with a compound annual growth rate (CAGR) of around 7% (Figure 1). In 2021, exports in digitally-delivered services amounted to USD 3.8 trillion, accounting for approximately 63% of global trade in services, according to UNCTADStat. Digitally deliverable services<sup>3</sup> export experienced strong growth during the 2020-2021 period, demonstrating the resilience of digitally-deliverable trade during the Covid-19 pandemic.

**Figure 1: Global exports of digitally-deliverable services, 2005-2021**



Source: Data from UNCTADStat

<sup>3</sup> According to UNCTAD (2022), digitally deliverable services (DDS), or services that can be delivered over information and communication technologies (ICT) networks, include ICT services themselves, sales and marketing services, insurance and financial services, professional services, back-office services, research and development (R&D), and education and training services, among others.

Digital trade is expected to bring abundant benefits to the socio-economic improvement. E-commerce provides consumers with access to online markets with a wide range of products and the ability to compare prices. On the supply side, e-commerce provides firms with easier entry and market diversification, even to markets abroad. Digital trade is expected to reduce trade costs, through digitalisation and paperless trade process which can be especially beneficial for MSMEs and firms from developing countries (see section 3).

While digital trade can bring about several benefits, there can be unintended consequences on the social and environment in a 'no-action' scenario (see section 5). This points to the need to have a proper policy framework, at both the domestic and regional level to ensure distributive outcomes of digital trade and the larger digital transformation.

This paper explores the linkages between SDGs, and especially indicators of performance of SDGs through the contribution of digital trade. We employ proxies for measuring both digital trade (section 2) and SDGs (section 3). We then explore the linkages between digital trade and SDGs using statistical and econometric analysis (section 4). Potential undesired consequences which can arise from digital trade are also examined to give a balanced view on digital trade (section 5). With the link between digital trade and SDGs established, the paper then explores the policies, including provisions in FTAs (section 6) and recommendations (section 7) to promote just and equitable outcomes of digital trade for all.



## 2. Digital Trade – A Theoretical Framework

While the concepts of e-commerce and digital trade have been used widely in business as in trade policy, there is no single recognised definitions of the two terms. Understanding the composition of digital trade is important in identifying the policy framework governing digital trade. To look at the scope of regulation of e-commerce, we examine the different use of the terms in existing frameworks and literature.

The UNCITRAL Model Law on Electronic Commerce (1996) does not provide a definition for the term ‘e-commerce’, leaving it to the broad interpretation of transaction based on “electronic data interchange (EDI)” – that is, computer-to-computer communication using pre-defined standards.<sup>4</sup>

The OECD (2011) defines electronic commerce, or e-commerce, as “*the sale or purchase of goods or services, conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders*”. This definition of e-commerce covers orders made in web pages, extranet or EDI, while excluding orders made by telephone calls, facsimiles, or manually typed e-mails (OECD, 2011).

At the multilateral level, e-commerce has been introduced into the work programme of the World Trade Organisation (WTO) since 1998. This led to the announcement of a joint statement on future negotiations on electronic commerce in 2019, with the participation of 89 WTO members (as of February 2023) (WTO, 2023). The consolidated negotiating text as of September 2021) proposes that “[*Digital trade/e-commerce*] means the production, distribution, marketing, sale or delivery of goods and services by electronic means”. This provides a broader definition compared to that of the OECD, as it covers all transactions whereby at least one stage of commerce is done using electronic means. For example, physical sale concluded following an online marketing campaign will also be counted as digital trade/e-commerce under the definition of the WTO E-commerce JSI. The JSI, however, has not been able to make a clear-cut division of digital trade and e-commerce under the current negotiating draft text, and the two terms are often, but not always, used interchangeably (Ismail, 2020).

In an effort to build a general conceptual framework to measure digital trade, the OECD, WTO, and IMF (2020) define digital trade as “*all trade that is digitally ordered and/or digitally delivered*.” This definition arguably has a broader coverage than the OECD (2011) definition (which focuses only on the sale), but a narrower scope than the proposed definition of the WTO (2021) (which cover any phase from making to selling of products). The OECD further clarifies that digital trade “*encompasses digitally enabled transactions of trade in goods and services that can either be digitally or physically delivered, and that involve consumers, firms, and governments*” (OECD, n.d.). In this sense, digital trade comprises of digitally ordered trade and digitally delivered trade, whereby:

---

<sup>4</sup> Article 2 (b) of the Model Law defines “Electronic data interchange (EDI)” as the electronic transfer from computer to computer of information using an agreed standard to structure the information. See (UNCITRAL, 1999).

- *Digitally ordered trade* is the international sale or purchase of a good or service, conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders. This is equivalent to the coverage of the OECD (2011) definition of e-commerce.
- *Digitally delivered trade* covers international transactions that are delivered remotely in an electronic format, using computer networks specifically designed for the purpose.

This definition, however, excludes the non-monetary transactions with regards to ‘data’ despite its undeniable role in the digital economy.<sup>5</sup> The movement of data, especially across borders, has becoming crucial, especially with the increasing use of new technology such as cloud computing, internet of things (IoT), big data analytics, or 3D printing. The use of data – without a proper regulatory framework – can act as a double-edged sword: it can help address development challenges, but also raises various concerns related to data privacy and security, competition, taxation, etc. (UNCTAD, 2019). This paper however will only explore the role of digital trade as means to achieving the SDGs, while a more thorough inquiry into the impact of data flow on SDGs is suggested for future research.

### **3. The Nexus between Digital Trade Policy and Sustainable Development**

In exploring the linkage between digital trade and sustainable development, we first consider the connection between trade and digitalisation vis-à-vis sustainable development. The concept of sustainable development was first introduced by the Brundtland Commission (formerly, the World Commission on Environment and Development, or WCED) as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. In other words, sustainable development requires a balanced approach to achieve equitable distribution and access to resources, without locking anyone out of the opportunities. Today, it has morphed into a catch-all terms that cut across three interdependent and mutually reinforcing pillars of economic growth, social inclusion, and environmental protection.

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015, comprise of 17 integrated objectives to serve as a "shared blueprint for peace and prosperity for people and the planet, now and into the future" (United Nations, n.d.).

---

<sup>5</sup> Data provides multiple functions in the digital trade flows: a mean of production, a medium for digital commercial transaction, an enabling factor for trade facilitation, and a ‘traded’ asset. ‘Traded’ is used to generally described the cross-border flow of data for commercial purposes, while the exchanged data does not necessarily generate payments. See (OECD, n.d.; Ciuriak & Ptashkina, 2018; Ciuriak & Ptashkina, 2020).

These 17 goals can be divided into three major pillar of sustainable development as below:



The linkage between trade and digitalisation, considered separately, with sustainable development has been widely discussed. Trade is considered a means to achieve the SDGs if it is inclusive and sustainable, as recognised in the 2030 Agenda and several targets under SDG 17, Partnerships for the Goals (Box 1). Indirectly, trade also contributes to many SDGs in one way or another (Box 2). Equally, digitalisation also, through various pathways, contributes to the realisation of SDGs under all three pillars of economic, social, and environmental sustainability (Box 3). The WTO (2018) estimates that technological changes are expected to increase trade growth by 2% overall and up to 25% for services trade, with developing countries likely to gain an increasing share of global trade subject to their ability to catch up on the adoption of digital technologies.

### Box 1: Trade-related SDG targets

#### Goal 17: Partnerships for the Goals

Target 17.10: Promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the World Trade Organization (WTO) including through the conclusion of negotiations within its Doha Development Agenda;

Target 17.11: Significantly increase the exports of developing countries, in particular with a view to doubling the share of LDCs' global exports by 2020;

Target 17.12: Realise timely implementation of DFQF market access on a lasting basis for all LDCs consistent with WTO decisions, including by ensuring that preferential rules of origin applicable to imports from LDCs are transparent and simple, and contribute to facilitating market access

### **Box 1: Evidence of trade's contribution to SDGs**

**Goal 2: Zero Hunger**. Correct and prevent trade restrictions and distortions in global agricultural markets that deny poor countries from much-needed export revenue and allow for better food security; eliminate export prohibitions or restrictions on foodstuffs purchased for non-commercial humanitarian purposes.

**Goal 5: Gender Equality**. Trade creates opportunities for the employment and economic development of women.

**Goal 8: Decent Work and Economic Growth**. Aid for Trade (AfT) for LDCs via the Enhanced Integrated Framework (EIF) targeting improved regional infrastructure to improve connectivity for both the formal and informal sector.

**Goal 9: Industry, Innovation and Infrastructure**. Cross-border connectivity and infrastructure, which allows for increased integration of SMEs into global markets and value chains.

**Goal 10: Reduced Inequalities**. Special and differential treatment (SDT) for developing countries, as per WTO agreements.

**Goal 13: Climate Action**. Trade measures in environmental goods and services

**Goal 14: Life Below Water**. Disciplines to eliminate harmful fishery subsidies particularly in more developed countries.

Source: Based on (Baker, 2021)

Several empirical studies point to the positive connections between digitalisation and sustainable development. Relevant to trade and economic growth, literature commonly utilises internet connectivity as a proxy to examine the linkage between digitalisation and trade. Caselli and Coleman (2001) find that computer adoption is associated with higher levels of human capital and manufacturing trade openness. Czernich et al. (2011) estimate that a 10-percentage point increase in broadband penetration raises annual per capita growth by up to 1.5 percentage points. Using firm-level export performance, Clarke (2008) finds that enterprises with internet connections in low and middle-income countries export more as part of their total sales. López González & Ferencz (2018) also point to the correlation between internet use and higher market and product diversification as digital connectivity facilitate more sectors to find more customers in foreign markets. This will in turn contribute to the reducing the independence and vulnerability of the economy. Andrenelli & Lopez-Gonzalez (2019) further argue that digital technologies increase export propensities of firms, especially SMEs, in developing countries. Digitalisation also strengthened firms' resilience to supply shocks during the COVID-19 pandemic. Using firm-level data in the Middle East and Central Asia region, Abidi *et al* (2022) find that digitally-enabled firms experience a lower decline of their sales in 2020 compared to digitally-constrained firms.

## **Box 2: Evidence of digitalisation's contribution to SDGs**

**Goal 3: Good Health and Well-being**. The provisions of digital health services to allow access to healthcare and medicines.

**Goal 4: Quality Education**. The provision of online education services to allow access to education at affordable costs.

**Goal 5: Gender Equality**. Digitalisation can be leveraged to promote the empowerment of women as entrepreneurs and traders, job creation and productive activities.

**Goal 8: Decent Work and Economic Growth**. Digitalisation can support productive activities and decent job creation and can encourage the growth of MSMEs.

**Goal 9: Industry, Innovation and Infrastructure**. Digitalisation can foster innovation and create new opportunities, for example smart cities, smart logistics systems, smart agriculture.

**Goal 13: Climate Action**. Digitalisation can be leveraged to lower carbon footprints with regard to economic transactions, logistics and service delivery.

**Goal 17: Partnerships for the Goals**. Digital trade can boost the exports of developing countries, allowing business to expand, reach more potential customers in domestic as well as foreign markets, in a more targeted way, and often at lower cost than through traditional channels.

On the above-analysed basis of the connexion between trade and digitalisation with SDGs, we now consider the impacts of digital trade in contributing towards the three sustainable development pillars.

E-commerce and digital trade can support production activities, job creation, entrepreneurship, and innovation (Target 8.3). This includes through the formalisation of micro, small and medium enterprises (MSMEs) in developing countries, as well as increasing access to ICT-enabled financial services such as online and mobile payments, especially for the unbanked and underbanked population (OECD & WTO, 2017). The rise of e-commerce also provides employment opportunities across job categories, from website developers, sale admins, digital marketers, couriers, etc., thus promoting employment and decent work for all (Target 8.5). E-commerce, with the power of allowing digitally ordered goods and services, will make trade more accessible, especially for MSMEs, to provide more goods and services and integrate better into the global value chains (Target 9.3). Generalising at the country level, digital trade offers opportunity to diversify export products and markets, especially for less developed countries (Target 8.2).

The contributions to economic development resulting from digital channels may also have impacts on certain social and environmental aspects, either directly or indirectly. The ability to support job creation and promotion of trade opportunities for all leads to other knock-on effects, especially in social areas. For example, digital trade can contribute to Goal 1 (No Poverty) through job opportunities and raising household income; however, participation in e-commerce requires costs to access (internet connectivity and communication devices) as well as digital skills,<sup>6</sup> which are related to the possible digital divide as will be further discussed in section 5. Furthermore, digital trade can be leveraged to promote women's roles as employees, entrepreneurs, and traders, thus contributing to women's economic empowerment (Target 5b). Online markets also provide information on food markets and food prices equally for businesses and consumers (Target 2.c). The bundling of services into “smart” products (such as smart watches or smart wears) allows users to better monitor health quality (Target 3.d). The technological advancement allowing the provision of telemedicine and telehealth services contributes to access to healthcare services and medicines (Target 3.8). Online education tools and platforms provide people living in remote areas access to training courses on several skills necessary for employment, decent jobs, and entrepreneurship (Target 4.4) (also see Box 3).

**Box 3: Digital trade promoting access to education, job creation, and health in developing economies**

According to the UNCTAD Digital Economy Report 2021, overall, developed economies have a larger share of their population undertaking activities such as internet banking, procuring information on goods and services and purchasing goods and services online etc. For professional development purposes, again developed economies scored higher level of use of the internet (except for Asian developing economies when it comes to job application).

However, when it comes to services such as formal online courses (education) and streaming services (entertainment), other regions show greater levels of activity. For instance, 28.5% of people in Latin America and the Caribbeans take classes online. Or a greater majority of individuals from developing economies in Asia download or stream content online. These figures illustrate how digitalisation of trade in goods and services can contribute to different SDGs goals concerning access to education, job creation, and health.

---

<sup>6</sup> The International Telecommunication Union (ITU) divides the digital skill sets required in current and future digital environments into 3 levels: (i) Basic digital skills – the ability to participate in a digital ecosystem at a minimum level to access and use digital technologies to perform basic tasks; (ii) Intermediate digital skills - the ability to use ICT tools to perform work-related tasks required for professional growth of a society and applicable to a wide range of job profiles; and (iii) Advanced digital skills – the knowledge to perform specialist tasks in the ICT industry to develop, manage and maintain the world of digital innovation. See (ITU, 2021).

**Table 1: Internet activities undertaken by individuals, by level of development and region (percent)**

Internet Activity	Developed Economies	Transition economies	Developing Economies - Africa	Developing Economies- Asia	Developing Economies – LAC
Internet Banking	62.3	14.9	9.8	34.8	11.6
Getting information on goods and services	83.9	50.9	30.6	68	51.8
Purchasing or ordering goods or services	53.9	18.2	14.6	29.1	13.1
Selling goods or services	16.8	7	3.5	6.4	9.3
Interacting with government	54.5	5.7	12.1	25.6	10.7
Seeking health information	62.4	37.5	24.3	47.1	41.1
Doing a formal online course	8.1	4.5	17.5	15.9	28.5
Seeking job or submitting a job application	17.4	9.8	14.3	19.9	16.6
Participating in professional networks	21	3.6	5.9	6.4	0.7
Streaming or downloading image, movies, videos or music playing or games.	57.4	52.9	64.2	66.4	50.8

Source: UNCTAD (2021) Digital Economy Report 2021

Digital trade can lead to more traditional trade across all sectors due to lower trade costs (López-González & Sorescu, 2022), and therefore increasing exports of developing countries (Target 17.11). Digitalised trade processes enable more streamlined cross-border flows of goods. The adoption of e-signatures, e-contracts, e-communications, and e-transferrable records can save time and costs for businesses conducting business across borders (see Box 4). This can also arguably contribute to potential resource saving due to the paperless movement of trade (Target 15.2).

#### **Box 4: Illustration of nuances involved in traditional trade flows**

In 2014, Maersk found that just a simple shipment of refrigerated goods from East Africa to Europe can go through nearly 30 people and organisations, including more than 200 different interactions and communications among them. Consequently, the cost of time spent waiting on paper stamps and e-mail replies is equal to the cost of the actual shipment (Groenfeld, 2017). On trade finance, Boston Consulting Group estimated that there are more than 20 players involved in each trade finance transaction, interacting with data fields captured in various documents (10–20 documents with more than 100 pages altogether), and generating approximately 5,000 data field interactions throughout an end-to-end process. Among those 5,000 data field interactions, there are only around 60-80 unique data fields (dates, amounts, reference number and others) being repeated throughout all documents. These duplications might result in discrepancies, thus errors, and inefficiency (BCG, 2017). To make the situation more complicated, each country has its own requirements regarding trade documents and the data elements they contained, as



prescribed in national and relevant international regulations in fields such as health, consumer protection, safety, tax, trade policy, environment, security.

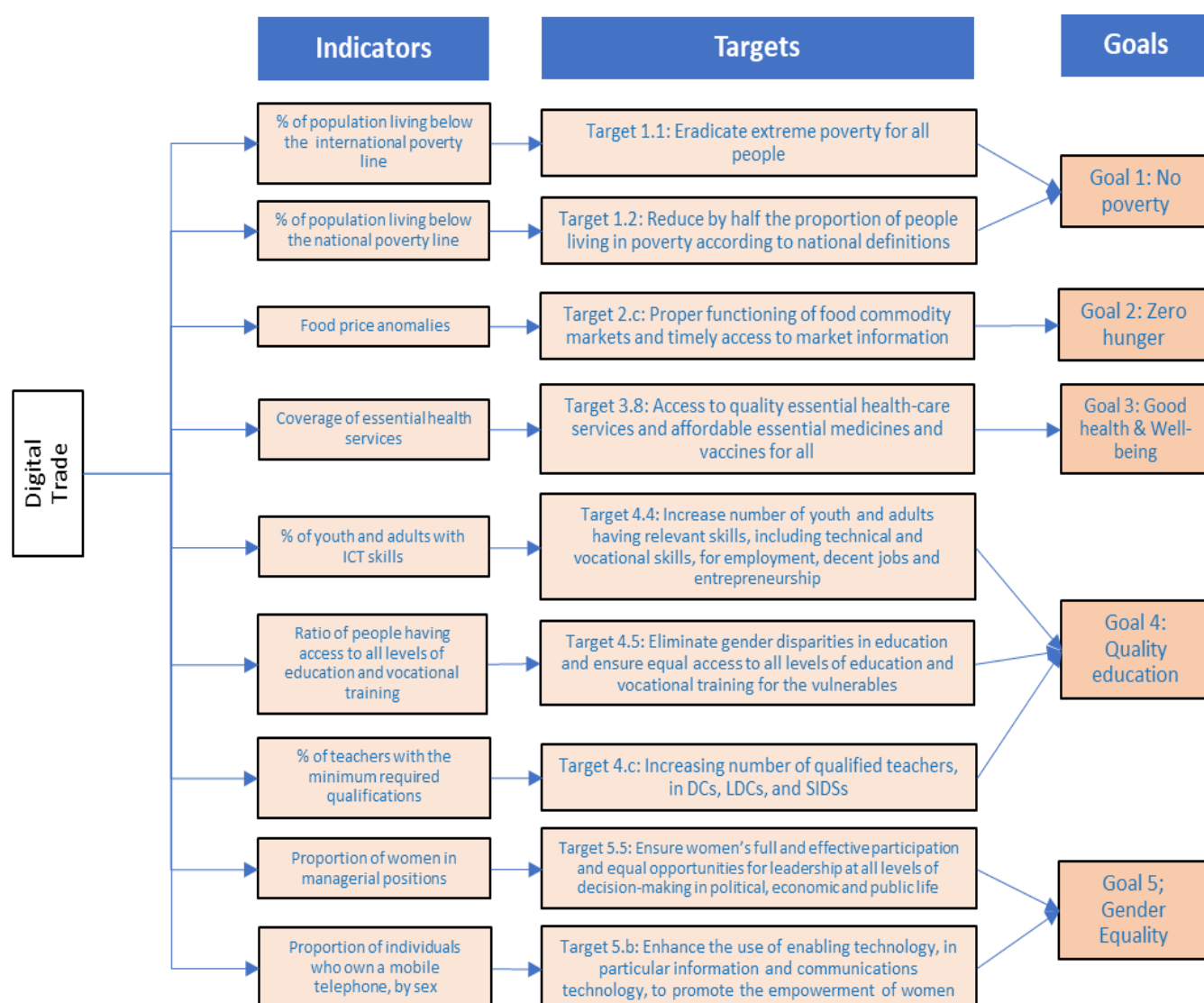
Based on the above pathway analysis, we create a map illustrating the linkage between digital trade and SDGs to the level of specific goals, targets, and indicators, while the next section will test some of these pathways and relationships empirically. We focused the analysis on those goals with the most direct effect,<sup>7</sup> based on the literature presented above, and drawing on the indicators established by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) (United Nations, n.d.). SDGs targets and their indicators are divided according to the economic, social, or environmental pillars (Figure 2). On the other hand, negative and indirect consequences of digital trade will be considered in section 5, which leads to the discussion on the possible policy measures to encounter those unintended impacts.

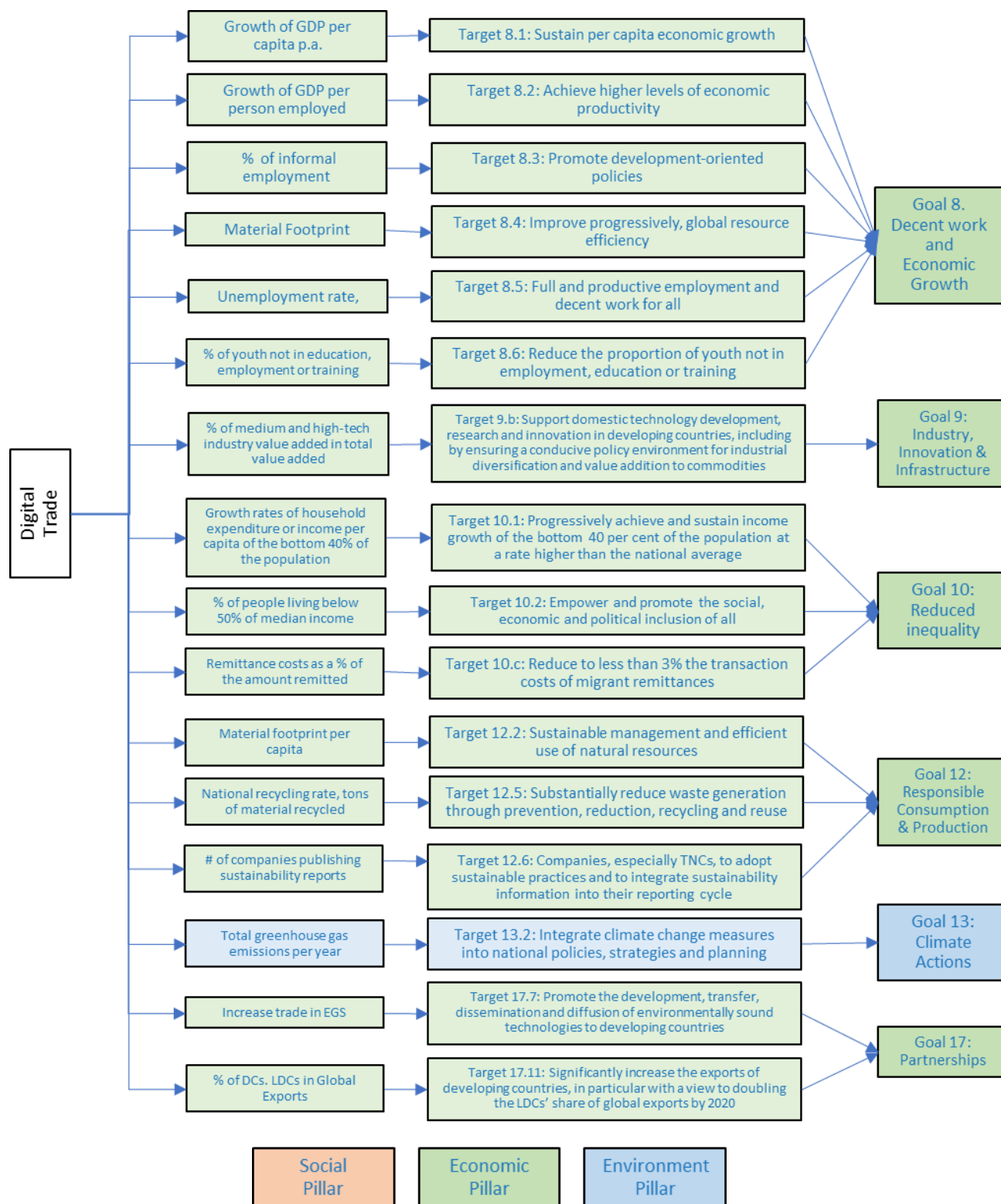
---

<sup>7</sup> For more information on other SDG Indicators, please refer to United Nations. (n.d.). SDG Indicators. Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development, at <https://unstats.un.org/sdgs/indicators/indicators-list/>.



**Figure 2: Digital trade and potential pathways to reach SDGs**



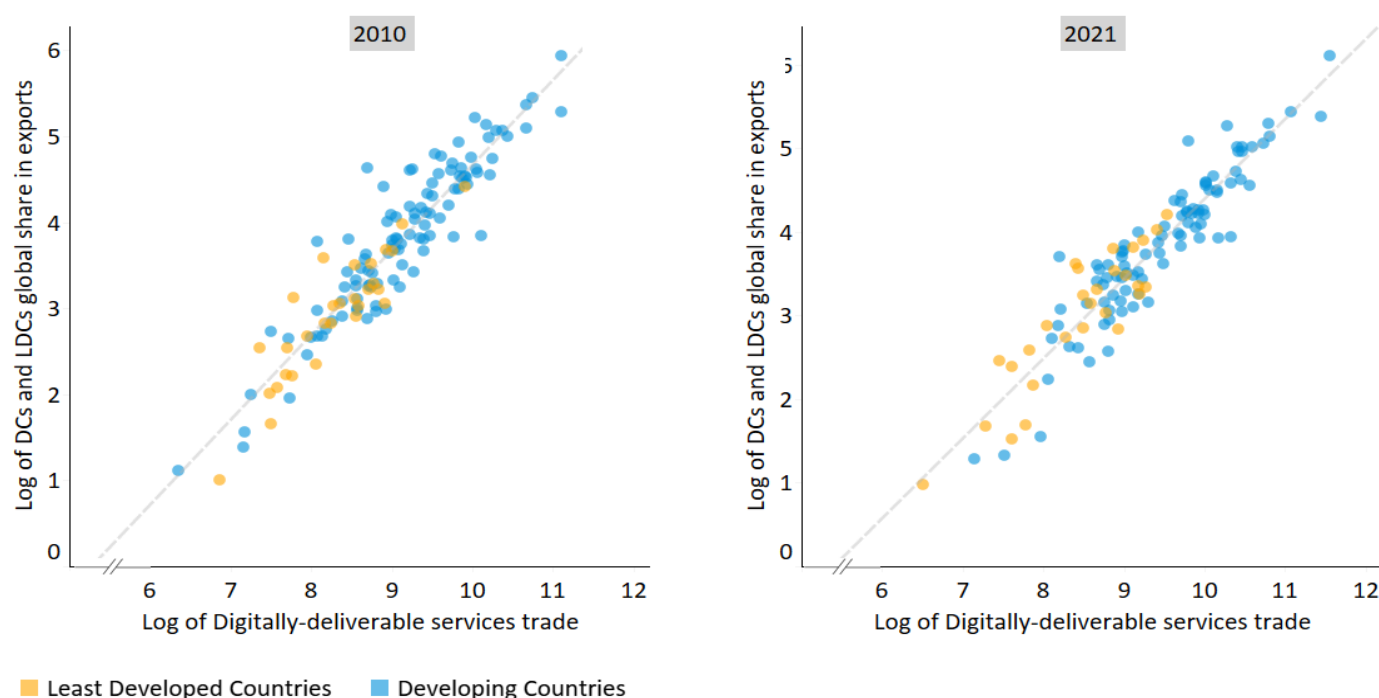


Note: The indicators are from the Official list of Global Sustainable Development Goal indicators developed by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) and agreed upon at the 48th session of the United Nations Statistical Commission held in March 2017. See (United Nations, n.d.).  
 Source: Authors' compilation

In order to further examine the linkages between digital trade and sustainable development, we looked into the empirical evidence for a nexus the between one digital trade index and SDG indicator.

An examination of the digitally deliverable services (DDS) trade (as a proxy for digital trade) and the share of DCs and LDCs in global exports as well as GDP per capita (as proxies for SDGs) show a strong correlation (Figure 3 and Figure 4). The relationship between DDS and global share of exports can be two-way. One the one hand, increasing DDS through digital channels contributes to increasing the share of exports by DCs and LDCs. On the other hand, as noted in the existing body of literature, exports of goods increased the demand for services exports through the “network effect”, especially with the use of knowledge-intensive services in manufacturing production (Hoekman & Mattoo, 2008; François & Hoekman, 2010; Eichengreen & Gupta, 2013; Sahoo & & Dash, 2017). The data also shows a positive correlation between digital trade and GDP per capita, which can be explained by the job creation and income generation effect of digital trade (Figure 4).

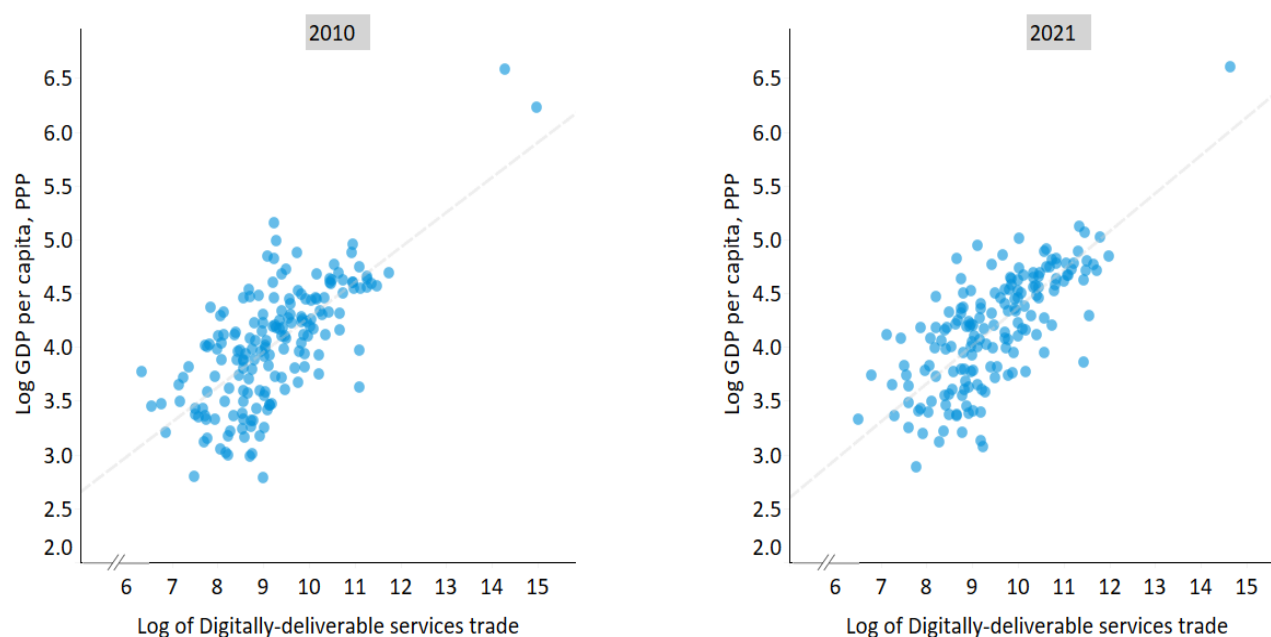
**Figure 3: Digitally-deliverable services trade vs. Export share by DCs and LDCs**



Note: Digitally deliverable services trade = import + export flows. Global share in exports covers both exports of goods and services.

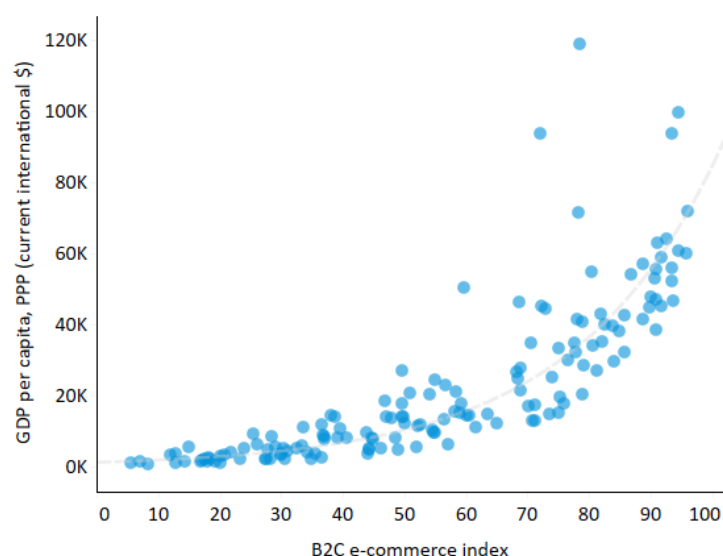
Source: Author, based on data from UNCTAD stats, World Bank WDI

**Figure 4: Digitally-deliverable services trade vs GDP per capita**



Source: Authors; UNCTAD stats, World Bank WDI

**Figure 5: B2C e-commerce index vs GDP per capita (PPP) (2020)**



Source: Authors; UNCTAD stats, World Bank WDI

Based on the observed positive relationship between selected SDG indicators and some digital indicators. We proceed to use an econometric approach to estimate the parameters of digital trade indicators on SDG indicators.

The first equation takes GDP per capita on the left-hand side of the equation, and a host of other explanatory variables on the right-hand side of the question. Explanatory variables refer to factors like life expectancy (as a proxy for health), literacy levels (as

a proxy for skills), digital services (as a proxy of technological progress), and government efficiency (as a proxy for institutions, political, regulatory system, and administrative systems). Indicators were chosen from search (Acemoglu, 2009).

The analysis is provided in Annex 1. Its results indicate that a 10% increase in the value of digital delivered services trade is associated with a 1% improvement in GDP per capita of a country. This finding complements the findings in the existing body of literature whereas services export performance contributes to increasing productivity at both the economy and firm levels, as well as to overall economic growth (François & Hoekman, 2010; Hoekman & Mattoo, 2008).

#### 4. Unintended Externalities of Digital Trade

Despite all the benefits conferred to trade fuelled by digital technologies, there are also several concerns arising from a digitalisation process, including market concentration, loss of privacy and security threats, the digital divide, etc. In addition to the traditional trade barriers, regulations on intellectual property rights, data flows, and privacy are likely to emerge as new sources of comparative advantage as well as trade barriers in the digital space. The distributive impact will also be likely to arise with the new business model with the “winner-takes-all” dynamics and new forms of barriers (such as to data flows) (WTO, 2018). These are even more challenging to countries whose domestic regulatory framework on digital trade has not been developed. As noted by Haddad (2022), developing countries, and especially LDCs, have rarely been involved in rulemaking on digital trade, and therefore specific concerns related to their development needs might not been fully reflected in digital trade talks.

Among the most discussed concern of digital transformation lies the issue of digital divide. Digital divide is defined as *“the unequal access and utility of internet communications technologies and explores how it has the potential to replicate existing social inequalities”* (Ragnedda & Muschert, 2013). The World Bank (2016) study on the implications of the digital economy for inclusive growth note that *“In many instances digital technologies have boosted growth, expanded opportunities, and improved service delivery. Yet their aggregate impact has fallen short and is unevenly distributed [...] Labor markets have become more polarised and inequality is rising—particularly in the wealthier countries, but increasingly in developing countries.”*

The World Bank GovTech Maturity Index (GTMI)<sup>8</sup> shows that digital inequality in the world is on the rise due to the different paces in which developed versus developing countries are implementing digital transformation (Gutierrez, 2022). The lack of inadequate infrastructure remains the main impediment to connectivity (World Bank,

---

<sup>8</sup> The GovTech Maturity Index (GTMI) introduce a measure of GovTech maturity in four focus areas — supporting core government systems, enhancing service delivery, mainstreaming citizen engagement, and fostering GovTech enablers—to assist the design of new digital transformation initiatives. See (World Bank, 2022).

2020), and thus the capability to capture the benefits of digital transformation and digital trade. For example, the ITU (2021) found that almost three quarters of people in LDCs have never connected to the Internet, with women being particularly marginalised. Disparities in access and connectivity will amplify existing divides among, as well as within, economies and groups of society (Portulans Institute, 2022; UNESCO, 2023; ITU, 2021; ITU, 2022). Inclusive growth will become harder as the digital transformation becomes more pervasive, thus barring the ability to connect and entry for lower-income groups. In addition to an adequate infrastructure, a stable investment and business environment created by an enabling regulatory framework will be crucial.

Lack of awareness and skills to use and benefit from e-commerce is another specific challenges. As noted by Ciurak and Ptashkina (2018) “the economics of the digital economy also promotes skewing of distributional gains, with skilled workers and connected individuals moving ahead, while others fall behind.” The ITU (2021) points to the divide that exists between countries: while in developed countries, 65% of all individuals have basic digital skills and 49% have standard skills, these numbers in developing countries are much lower, at 46% and 20%, respectively. This gap risk further dividing the developed and developing countries, as well as the skilled and unskilled workforce in the context of increasing digital trade and digital economy. For bridging the skill gaps, education and training therefore play a key role in equipping the workforce with the right set of skills and ensuring that everyone enjoys the benefits of the digital transformation (ILO, 2021).

Especially for women, several barriers affecting their participation in offline trade are also at play when considering e-commerce. These include lower levels of access to the internet and technology, lower access to education and digital skills development, as well as lower capital and access to finance (Zarrilli, 2022). The OECD (2018) further emphasises the inherent gender biases and socio-cultural norms as the root cause of gender-based digital exclusion. These factors, in combination, lead to the disadvantaging of women and limit the accessibility of women-led businesses to benefit from digital trade.

The resulting stratification of the digital transformation also give rise to other social concerns. For example, as a result of the ability to virtually deliver services (including through Mode 1 – Cross border provision of services), there has been a revolution of the so-called “gig” economy. The gig economy has changed the nature of work arrangements by providing flexible employment opportunities. However, on the downside, it also creates a gap in access to social benefits, such as unemployment insurance and health benefits (Ciuriak & Ptashkina, 2018).

Digitalisation, including those used for trade-related purposes, also triggers various environmental concerns. Distribution, packaging and return of goods are the primary sources of carbon emissions directly linked to e-commerce activities. Weideli (2013) calculates that one online shopping process may leave a carbon footprint of 1.5kgCo<sub>2</sub>,

much lower than traditional shopping. However, shopping consumer behaviours that include online shopping steps (such as conducting both online searches and store visits before making purchasing decisions) are not always environmentally better. Additionally, while several use cases of digital trade supporting environment sustainability can be cited (TechUK, 2023), the use of technology infrastructure to support digitalisation can also put pressure on the ecosystem. For example, blockchain has been closely associated with high energy consumption. According to the Cambridge Center for Alternative Finance (CCAF) (2023), Bitcoin consumed around 107 Terawatt Hours in 2022, equal to the consumption level of the Netherlands in a whole year (World Population Review, 2023). The US White House (2022) estimates that crypto-asset activities in this country emit approximately 25 to 50 Mt CO<sub>2</sub>/y, which is similar to emissions from diesel fuel used in railroads in the United States.

Another issue concerns to the greenhouse gas (GHG) emissions related to the production and use of electronic devices that are supporting the expansion of e-commerce. For example, according to Greenpeace (2017), up to 80% of GHG emissions emanating from smartphones can be traced back to their production, 16% to customer usage throughout its lifecycle. The production of a single smartphone uses as much energy as the amount needed to charge it for a decade. Furthermore, as the demand for electronic devices increase, concerns have been raised over electric waste (e-waste). As per the United Nations Global E-waste Monitor report, in 2019, around 53.6 million tonnes of e-waste were generated globally. The rates of recycling e-waste however differ greatly, from 11.7% in Asia to 42.5% in the Europe (Forti, Cornelis, Ruediger, & Garam, 2020). The amount of e-waste is rising at an alarming pace to reach over 74 million tonnes in 2023 and nearly 110 million tonnes in 2050, with the majority coming out of Asia (Parajuly, et al., 2019).

Once again, these potential externalities of digital trade point to the need of a proper policy framework, at both the domestic and regional level to further the positive outcomes while at the same time, containing the unintended impacts to ensure distributive outcomes of digital trade and the larger digital transformation.

## **5. Toward an Inclusive and Sustainable Digital Trade Policy Framework**

With the uptake of digital transformation and the resulting flows of data, digital trade now consists of not only four but five flows: goods, services, capital, natural person, and data. For the cross-border flows of good and services (and the trade-related aspect of capital and natural person movement), the regulatory framework has been established at the multilateral level with the conclusion of the General Agreement on Tariffs and Trade (GATT) 1947 and the WTO Agreements in 1994 (including, among

other, the General Agreement on Trade in Services-GATS). Under the Interim Report to the General Council regarding Work Programme on Electronic Commerce (S/C/8), the Council for Trade in Services notes there has been a common understanding that *“The electronic delivery of services falls within the scope of the GATS, since the Agreement applies to all services regardless of the means by which they are delivered, and electronic delivery can take place under any of the four modes of supply.”* The report also highlights the “technological neutrality” rule, whereby electronic supply of services is permitted by [GATS] specific commitments unless the schedule states otherwise. The report, however, leaves many uncertainties regarding the adoption of other specific rules related to e-commerce. Among these, one of the key unsettled issues is on whether certain products delivered electronically (such as e-book, or 3D-printing) might be classified as goods, and therefore subject to GATT disciplines, rather than as services. Adding to the complexity, rules on trade-related aspects of data however are still at the exploratory phases, whereby a single set of rules is missing but different regulatory approaches have been established through unilateral, bilateral, or regional initiatives (Kuner, 2013; Gao, 2021).

For domestic e-commerce legislation, the United Nations Conference on Trade and Development (UNCTAD) identifies 4 key areas: electronic transaction laws, data protection/data privacy laws, cybercrime laws, and consumer protection laws (UNCTAD, 2023). While these four areas cover the core legislations, they leave out many other areas affecting e-commerce, such as on content regulation, domain names, cloud computing, as well as other areas affecting cross-border e-commerce. Jaller, Gaillard, & Molinuevo (2020) , however, note that having an “e-commerce law” of similarly titled instruments is not necessarily indicative of the soundness of the country’s regulation on digital trade. To assess the e-commerce readiness of a country, UNCTAD provides a more holistic framework by looking at the seven policy areas. In addition to the e-commerce policies and strategies (policy level) and legal and regulatory frameworks (regulatory level), the UNCTAD framework also suggest an assessment of the ICT infrastructure and e-commerce support services; trade facilitation and logistics; payment solutions; access to financing; and skills development.<sup>9</sup> This provide a broader coverage involving also certain aspects of cross-border e-commerce (i.e., trade facilitation) and inclusion (access to financing and skills development).

Given the broad coverage and the cross-cutting nature of this area, an e-commerce regulatory framework might cover several aspects under the four broad regulatory areas identified by the UNCTAD. The World Bank (2020) looks at the regulatory framework for digital markets from two perspectives: facilitative and restrictive measures. Measures that seek to facilitate electronic transactions and promote trust in digital markets cover regulation on e-documents and e-signatures, consumer protection, intermediary liability, privacy and data protection, and cybersecurity. Regulatory restrictions in digital markets include measures such as domain name

---

<sup>9</sup> See <https://etradeforall.org/about/policy-areas/>



restrictions, bans of online sales, and regulations on cross-border data flows. There are also many other policy areas relevant to digital trade such as regulations on competition policy, taxation, intellectual property, business license requirements, etc.

By looking into policy measures that can potentially hinder digital trade, the European Centre for International Political Economy (ECIPE) suggests a framework for the categorisation of measures affecting digital trade under its Digital Trade Restrictiveness Index (DTRI) methodology (ECIPE, 2018). The ECIPE DTRI however focuses more on regulatory aspects that might hinder digital trade. Some areas that are not explicitly covered include licenses for e-commerce activities, online consumer protection and channels for effective dispute settlements, or redress mechanisms against anti-competitive practices online. Areas affecting the inclusion and sustainable development issues related to digital trade are not explicitly included.

In the same vein, the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) also develop a regulatory framework for the Regional Digital Trade Integration Index (RDTII) (ESCAP & OECD, 2022). The ESCAP RDTII considers digital trade regulatory framework as a composition of three policy cluster: traditional trade policy (which corresponds to the market access measures), domestic regulations, and digital governance (which addresses the newly arising issues related to the online provisions of products and data-related issues). However, within this framework, sustainable development elements are seemingly missing.

With the WTO plurilateral negotiations on ecommerce has been unsettled after 25 years of the introduction, e-commerce has been introduced on the agenda of trade policy makers, developed and developing countries alike, through regional trade agreements. E-commerce rules have been incorporated in more than a quarter of all FTAs notified to the WTO (Monteiro & Teh, 2017). While e-commerce provisions are still heterogeneous across all FTAs, the most common types of e-commerce provisions refer to issues such as electronic authentication, consumer protection, personal information protection and paperless trading, as well as general rules on e-commerce promotion, cooperation and the moratorium on customs duties. An increasing number of FTAs also cover areas such as personal information protection, unsolicited commercial electronic messages, Internet interconnection charge sharing, code source and cybersecurity (Monteiro & Teh, 2017). Ebrahimi Darsinouei & Kaukab (2017) suggest the division of e-commerce-related provisions in trade agreements into three main categories: (i) **market access** provisions covering customs duties, treatment of digital products, cross-border information flows, electronic supply of services; (ii) **specific rules and regulations** covering consumer protection, privacy and data protection, unsolicited commercial e-mails, domestic electronic transactions frameworks; and (iii) **trade facilitation** provisions paperless trade administration, cooperation, transparency, electronic authentication. Among these areas, some have reached certain level of agreement globally, such as the moratorium on applying duties to electronic transmissions. Other issues are dealt with under different levels of commitments and approaches.

Furthermore, there have been arising a new class of the so-called digital-only or digital economy agreements (DEAs), starting with the Digital Economy Partnership Agreement (DEPA) signed in June 2020 between Chile, New Zealand and Singapore.<sup>10</sup> The agreement builds upon the e-commerce chapters of existing FTAs while at the same time adding enhanced commitments addressing a range of emerging digital economy issues, such as artificial intelligence, fintech, open government data, digital identities, etc. SMEs cooperation and digital inclusion are also included, however, mainly at the ‘best endeavour’ level of commitment. **Table 2** below provides a mapping of sustainability-related provisions in digital trade agreements or other frameworks that can promote trade and remedy the unintended externalities of trade digitalisation.

**Table 2: Sustainability-related provisions in digital trade agreements/chapters**

<b>Small and Medium Enterprises</b>	<b>Information Sharing:</b> Provision to ensure publicly accessible information that can be relevant or beneficial to SMEs.
	<b>SME Cooperation:</b> Provision to establish a cooperation framework to enhance trade and investment opportunities for SMEs in the Digital Economy through information exchange, SMEs’ participation in government procurements, and SMES trade and investment platforms.
	<b>Digital SME Dialogue:</b> Provision to establish a Digital SME Dialogue including private sector, non-government organisations, academic experts, and other stakeholders to promote relevant collaboration efforts and initiatives supporting SMEs and digitalization.
<b>Digital Inclusion</b>	<b>Digital Inclusion:</b> Provision to address barriers in accessing digital economy opportunities and promote digital inclusion, including through promoting access to digital infrastructure, and participation of women, rural populations, low socio-economic groups and Indigenous Peoples in the digital economy.
	<b>Women Participation in Digital Trade:</b> Provision to facilitate participation by women and women-led enterprises in digital trade through cooperation, information sharing, and technical assistance.
	<b>Digital Skills Development:</b> Provisions to address digital skill gaps and provide capacity building to improve digital literacy skills training.
<b>Innovation</b>	<b>Public Domain:</b> Provision to recognize the importance of accessible public domain and publicly accessible databases for the development of the digital and knowledge-based economy.

<sup>10</sup> Canada submitted a formal request to launch negotiations for Canada's accession to the DEPA on May 22, 2022. On August 24, 2022, the DEPA Parties established a Working Group for Canada to begin DEPA accession negotiations. See (Government of Canada, 2022).

	<b>Open Government Data:</b> Provision to facilitate public access to and use of open government information to foster economic and social development, competitiveness, and innovation.
<b>Transparency</b>	<b>Publication:</b> Provision to ensure that laws, regulations, procedures, and administrative rulings related to digital trade and digital economy are promptly published or otherwise made available to access by interested persons
	<b>Administrative Proceedings:</b> Provision to ensure that related persons are provided with prior notice and reasonable opportunity to present facts and arguments in support of their positions in an administrative proceeding ('right to be heard').
	<b>Review and Appeal:</b> Provision to establish or maintain independent judicial, quasi-judicial, or administrative tribunals, or procedures for the purpose of the prompt review and correction of final administrative actions regarding matters related to digital trade or digital economy

Source: Authors' compilation

## 6. Conclusion and Policy Implications

Digital technologies are unlocking new pathways for rapid economic growth, innovation, job creation, as well as access to goods and services. However, there are still challenges in implementing the digital transformation in the trade arena. These include strengthening the coordination framework, aligning policies and sector regulation and the need for a massive scaling-up of investment and dedication of resources. To reap the benefits of digital transformation, affordable and accessible connectivity is the first and foremost condition to give people access to digital platform, goods, and services.

The mapping provided in section 3 points out anecdotal accounts of possible linkages between digital trade and SDGs. The unintended externalities, as pointed out in section 5, are imminent unless a balanced policy framework is in place to promote the positive outcomes and eliminate the negative outcomes. In examining the linkages between digital trade and sustainability, this paper hopes to contribute to the theoretical framework integrating the sustainability aspects into national and regional digital trade policy for better monitoring and promoting of sustainable development and digital trade policy.

Sustainable development should be an explicit goal in the digital policy-making process. For example, to guide a common approach in digital trade and sustainable development, an international framework such as the RDTII could be considered to

expand to a cross-cutting pillar covering the sustainability aspects of digital trade, such as provision on digital inclusion, digital innovation, and provisions supporting SMEs and women.

Digital infrastructure investments will be a crucial factor in bridging the gap between developed and less developed countries. Furthermore, bridging the digital divide will also involve making digital technologies more affordable to all, including for women and population located in remote areas. For gender-based divide, policy actions should aim to foster women's full participation and inclusion in the digital economy, while awareness raising efforts should target altering the ingrained social norms that lead to discrimination against women. Digital data collection, including disaggregated data by gender, will also be crucial to support the evidenced-based policy-making process. The current most extended effort in measuring digital economy is potentially the OECD, WTO and IMF (2020) Handbook on Measuring Digital Trade; however, gender-disaggregated data is not included; therefore a combination of use with existing datasets maintained by the ITU, the World Bank, and national statistics will be needed.

The potential externalities of digital trade, as discussed in section 5, point to the need for a proper policy framework at both the domestic and regional levels to further the positive outcomes while, at the same time, containing the unintended impacts to ensure distributive outcomes of digital trade and the larger digital transformation. There is a need to balance regulation with facilitation to avoid locking out of the digital market vulnerable groups, such as women, the informal workforce, and MSMEs. Policies appealing to increase investments in digital infrastructure should be designed under a sustainable development microscope to ensure healthy competition as well as environment and social consciousness. It is important to consider the impact on jobs, environment, and society to avoid a 'race to the bottom'. In this sense, digital skills strengthening will be key to ensure the organic and sustained growth of the digital economy. Finally, considering the patchwork of current FTA provisions on digital trade and e-commerce, global efforts should be strengthened to finalise a common model framework for regulating digital trade.

## List of references

- Abidi, N., Herradi, M. E., & Sakha, S. (2022). *Digitalization and Resilience: Firm-level Evidence During the COVID-19 Pandemic*. IMF Working Papers, 2022(034). International Monetary Fund. Obtenido de <https://www.elibrary.imf.org/view/journals/001/2022/034/article-A001-en.xml>
- Acemoglu, D. (2009). *Introduction to modern economic growth*. Princeton, NJ: Princeton University Press.
- Andrenellii, A., & López-González, J. (2019). *Electronic transmissions and international trade - shedding new light on the moratorium debate*. OECD Trade Policy Papers No. 233. Paris: OECD Publishing. doi:<https://doi.org/10.1787/57b50a4b-en>.
- Baker, P. (2021). *Handbook on negotiating sustainable development provisions in preferential trade agreements*. Bangkok: United Nations Economic and Social Commission for Asia and the Pacific. Obtenido de <https://repository.unescap.org/handle/20.500.12870/4285>
- BCG. (2017). *Digital Innovation in Trade Finance. Have We Reached a Tipping Point?* Boston Consulting Group. Obtenido de <https://www.swift.com/news-events/news/digital-innovation-trade-finance-have-we-reached-tipping-point>
- Caselli, F., & Coleman, W. J. (2001). *Cross-Country Technology Diffusion: The Case of Computers*. NBER Working Paper 8130. National Bureau of Economic Research. Obtenido de <http://www.nber.org/papers/w8130>
- CCAF. (2023). *Cambridge Bitcoin Electricity Consumption Index*. Obtenido de Cambridge Centre for Alternative Finance: <https://ccaf.io/cbeci/index>
- Ciuriak, D., & Ptashkina, M. (2018). *The Digital Transformation and the Transformation of International Trade*. International Centre for Trade and Sustainable Development (ICTSD) & Inter-American Development Bank (IDB).
- Ciuriak, D., & Ptashkina, M. (2020). *Toward a Robust Architecture for the Regulation of Data and Digital Trade*. CIGI Papers No. 240. Centre for International Governance Innovation (CIGI). Obtenido de [https://www.cigionline.org/static/documents/documents/no240\\_0.pdf](https://www.cigionline.org/static/documents/documents/no240_0.pdf)
- Clarke, G. (2008). Has the Internet Increased Exports for Firms from Low and Middle-Income Countries. *Information Economics and Policy* 20, 16-37.
- Czernich, N., Falck, O., Kretschmer, T., & Woessmann, L. (2011). Broadband Infrastructure and Economic Growth. *Economic Journal* 121 (552), 505-32.
- Darsinouei, A. E., & Kaukab, R. S. (2017). *Understanding E-Commerce Issues in Trade Agreements: A Development Perspective Towards MC11 and Beyond*. Geneva: CUTS International. Obtenido de <https://www.cuts-geneva.org/pdf/STUDY%20-%20E-Commerce%20Towards%20MC11.pdf>

- Daza Jaller, L., Gaillard, S., & Molinuevo, M. (2020). *The regulation of Digital Trade: Key policies and international trends*. Washington, DC: World Bank. Obtenido de <https://openknowledge.worldbank.org/handle/10986/33164>
- ECIPE. (2018). *Digital Trade Restrictiveness Index*. European Center for International Political Economy. Obtenido de [https://ecipe.org/wp-content/uploads/2018/05/DTRI\\_FINAL.pdf](https://ecipe.org/wp-content/uploads/2018/05/DTRI_FINAL.pdf)
- Eichengreen, B., & Gupta, P. (2013). Exports of services: Indian experience in perspective. *Indian Growth and Development Review*, 6(1), 35-60.
- ESCAP & OECD. (2022). *Asia-Pacific Digital Trade Regulatory Review 2022*. United Nations. Obtenido de <https://www.unescap.org/kp/2022/asia-pacific-digital-trade-regulatory-review-2022>
- Forti, V., Cornelis, P. B., Ruediger, K., & Garam, B. (2020). *The Global E-waste Monitor 2020: Quantities, flows, and the circular economy potential*. Bonn / Geneva / Rotterdam: United Nations University (UNU)/United Nations Institute for Training and Research (UNITAR) – co-hosted SCYCLE Programme, International Telecommunication Union (ITU) & International Solid Waste Association (ISWA). Obtenido de [https://ewastemonitor.info/wp-content/uploads/2020/11/GEM\\_2020\\_def\\_july1\\_low.pdf](https://ewastemonitor.info/wp-content/uploads/2020/11/GEM_2020_def_july1_low.pdf)
- François, J., & Hoekman, B. (2010). Services trade and policy. *Journal of Economic Literature*, 48(3), 642-692.
- Gao, H. (2021). *Data Sovereignty and Trade Agreements: Three Digital Kingdoms*. Obtenido de <https://ssrn.com/abstract=3940508>
- Government of Canada. (25 de August de 2022). *Background: Canada's possible accession to the Digital Economy Partnership Agreement*. Obtenido de Government of Canada: <https://www.international.gc.ca/trade-commerce/consultations/depa-apen/background-information.aspx?lang=eng>
- Greenpeace. (2017). *Guide to Greener Electronics*. Washington D.C. Obtenido de <https://www.greenpeace.org/usa/wp-content/uploads/2017/10/Guide-to-Greener-Electronics-2017.pdf>
- Groenfeld, T. (5 de March de 2017). *IBM And Maersk Apply Blockchain To Container Shipping*. Obtenido de Forbes: <https://www.forbes.com/sites/tomgroenfeldt/2017/03/05/ibm-and-maersk-apply-blockchain-to-container-shipping/?sh=7dea9be93f05>
- Gutierrez, A. H. (16 de November de 2022). *Closing the digital divide; Rich countries are doing better*. Obtenido de World Bank Blog: <https://blogs.worldbank.org/voices/closing-digital-divide-rich-countries-are-doing-better>

- Haddad, M. (16 de December de 2022). *In digital trade talks, the voices of least developed countries are missing*. Obtenido de World Bank Blog: <https://blogs.worldbank.org/trade/digital-trade-talks-voices-least-developed-countries-are-missing>
- Hoekman, B., & Mattoo, A. (2008). *Services Trade and Growth. Policy Research Working Paper No. 4461*. Washington, DC: World Bank.
- ILO. (2021). *Changing demand for skills in digital economies and societies. Literature review and case studies from low- and middle-income countries*. International Labour Organization. Obtenido de [https://www.ilo.org/wcmsp5/groups/public/-ed\\_emp/-ifp\\_skills/documents/publication/wcms\\_831372.pdf](https://www.ilo.org/wcmsp5/groups/public/-ed_emp/-ifp_skills/documents/publication/wcms_831372.pdf)
- Ismail, Y. (2020). *E-commerce in the World Trade Organization: History and latest developments in the negotiations under the Joint Statement*. Geneva: O International Institute for Sustainable Development and CUTS International. Obtenido de <https://www.iisd.org/system/files/publications/e-commerce-world-trade-organization-.pdf>
- ITU. (2021). *Digital Skills Insights 2021*. Geneva: International Telecommunication Union. Obtenido de [https://academy.itu.int/sites/default/files/media2/file/21-00668\\_Digital-Skill-Insight-210831\\_CSD%20Edits%206\\_Accessible-HD.pdf](https://academy.itu.int/sites/default/files/media2/file/21-00668_Digital-Skill-Insight-210831_CSD%20Edits%206_Accessible-HD.pdf)
- ITU. (2021). *Measuring digital development Facts and Figures 2021*. Obtenido de <https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2021.pdf>
- ITU. (6 de June de 2022). *Global potential of Internet remains largely untapped, says UN agency for digital technology*. Obtenido de International Telecommunication Union: <https://www.itu.int/en/mediacentre/Pages/PR-2022-06-06-Global-potential-of-internet-remains-untapped.aspx>
- Jaller, L. D., Gaillard, S., & Molinuevo, M. (2020). *The regulation of Digital Trade. Key policies and international trends*. The World Bank Group. Obtenido de <https://documents1.worldbank.org/curated/en/998881578289921641/pdf/The-Regulation-of-Digital-Trade-Key-Policies-and-International-Trends.pdf>
- Kuner, C. (2013). *Typology of Regulatory Approaches* (Oxford, 2013; online edn, Oxford Academic, 26 Sept. 2013),. En *Transborder Data Flows and Data Privacy Law* (págs. 61-80). Oxford Academic. Obtenido de <https://doi.org/10.1093/acprof:oso/9780199674619.003.0003>
- López-González, J., & Ferencz, J. (2018). *Digital Trade and Market Openness. OECD Trade Policy Papers No. 217*. Paris: OECD Publishing. doi:<https://doi.org/10.1787/1bd89c9a-en>
- López-González, J., & Sorescu, S. (2022). *Opportunities and challenges for trade in the digital era. Aid-for-Trade Workshop Digital connectivity and economic diversification*. Obtenido de [https://www.wto.org/english/tratop\\_e/devel\\_e/a4t\\_e/wto\\_ctd\\_digital\\_connectivity\\_workshop\\_7\\_february\\_2022\\_oecd.pdf](https://www.wto.org/english/tratop_e/devel_e/a4t_e/wto_ctd_digital_connectivity_workshop_7_february_2022_oecd.pdf)

- Monteiro, J.-A., & Teh, R. (2017). *Provisions on Electronic Commerce in Regional Trade Agreements*. WTO Working Paper ERSD-2017-11. World Trade Organization. Obtenido de [https://www.wto.org/english/res\\_e/reser\\_e/ersd201711\\_e.pdf](https://www.wto.org/english/res_e/reser_e/ersd201711_e.pdf)
- OECD & WTO. (2017). *Aid for Trade at a Glance 2017: Promoting Trade, Inclusiveness and Connectivity for Sustainable Development*. Geneva & Paris: WTO & OECD Publishing. Obtenido de [https://doi.org/10.1787/aid\\_glance-2017-en](https://doi.org/10.1787/aid_glance-2017-en)
- OECD. (2011). *OECD Guide to Measuring the Information Society 2011*.
- OECD. (2018). *Bridging the Digital Gender Divide. Include, Upskill, Innovate*. Organisation for Economic Co-operation and Development. Obtenido de <https://www.oecd.org/digital/bridging-the-digital-gender-divide.pdf>
- OECD. (n.d.). *Digital trade*. Obtenido de OECD: <https://www.oecd.org/trade/topics/digital-trade/>
- OECD, WTO & IMF. (2020). *Handbook on Measuring Digital Trade*. Obtenido de <https://www.oecd.org/sdd/its/Handbook-on-Measuring-Digital-Trade-Version-1.pdf>
- Parajuly, K., Kuehr, R., Awasthi, A. K., Fitzpatrick, C., Lepawsky, J., Smith, E., . . . Zeng, X. (2019). *Future E-waste Scenarios*. Osaka: StEP (Bonn), UNU ViE-SCYCLE (Bonn) & UNEP IETC.
- Portulans Institute. (2022). *The Network Readiness Index 2022*. Obtenido de <https://networkreadinessindex.org>
- Ragnedda, M., & Muschert, G. W. (2013). *The Digital Divide*.
- Sahoo, P., & Dash, R. K. (2017). What drives India's surge in service exports? . *The World Economy*, 40(2), 439-461.
- TechUK. (06 de April de 2023). *Digital Trade and sustainability - Showcasing the role of digital trade in tackling climate change*. Obtenido de Tech UK: <https://www.techuk.org/resource/digital-trade-and-sustainability-showcasing-the-role-of-digital-trade-in-tackling-climate-change-techukdigitaltrade.html>
- The White House. (8 de September de 2022). *FACT SHEET: Climate and Energy Implications of Crypto-Assets in the United States*. Obtenido de The White House: <https://www.whitehouse.gov/ostp/news-updates/2022/09/08/fact-sheet-climate-and-energy-implications-of-crypto-assets-in-the-united-states>
- UNCITRAL. (1999). *UNCITRAL Model Law on Electronic Commerce with Guide to Enactment 1996 with additional article 5 bis as adopted in 1998*. New York: United Nations. Obtenido de



[https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/19-04970\\_ebook.pdf](https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/19-04970_ebook.pdf)

UNCTAD. (2019). *The value and role of data in electronic commerce and the digital economy and its implications for inclusive trade and development. Trade and Development Board Intergovernmental Group of Experts on E-commerce and the Digital Economy. Third session.* Geneva: United Nations Conference on Trade and Development. Obtenido de [https://unctad.org/system/files/official-document/tdb\\_ed3d2\\_en.pdf](https://unctad.org/system/files/official-document/tdb_ed3d2_en.pdf)

UNCTAD. (2021). *Covid-19 and E-Commerce. A Global view.* New York: United Nations. Obtenido de [https://unctad.org/system/files/official-document/dtlstict2020d13\\_en\\_0.pdf](https://unctad.org/system/files/official-document/dtlstict2020d13_en_0.pdf)

UNCTAD. (2021). *Estimates of global e-commerce 2019 and preliminary assessment of covid-19 impact on online retail 2020. UNCTAD Technical Notes on ICT for Development No. 18.* United Nations. Obtenido de [https://unctad.org/system/files/official-document/tn\\_unctad\\_ict4d18\\_en.pdf](https://unctad.org/system/files/official-document/tn_unctad_ict4d18_en.pdf)

UNCTAD. (2021). *Global E-Commerce Jumps to \$26.7 Trillion, Covid-19 Boosts Online Retail Sales.* Obtenido de UNCTAD: <https://unctad.org/press-material/global-e-commerce-jumps-267-trillion-covid-19-boosts-online-retail-sales>

UNCTAD. (2022). *Digitalization of Services: What does it imply to trade and development?* Obtenido de <https://unctad.org/publication/digitalization-services-what-does-it-imply-t>

## Annex 1: Econometric estimation of the contribution of DDS on SDG

Based on the observed positive relationship between selected SDG indicators and some digital indicators. We proceed to use an econometric approach to estimate the parameters of digital trade indicators on SDG indicators.

The first equation takes GDP per capita on the left-hand side of the equation, and a host of other explanatory variables on the right-hand side of the equation. Explanatory variables refer to factors like life expectancy (as a proxy for health), literacy levels (as a proxy for skills), digital services (as a proxy of technological progress), and government efficiency (as a proxy for institutions, political, regulatory system, and administrative systems). Indicators were chosen from search (Acemoglu, 2009).

The equation is given by:

$$\ln(y_t) = \alpha_t + \beta_1 \ln(DDS_t) + \beta_2 \ln(LIFE_t) + \beta_3 \ln(LIT_t) + \beta_4 \ln(GOV_t) + \beta_5 DC_{LDC_t} + \varepsilon_t \quad (1)$$

Where

$y_t$ : GDP per capita in nominal terms at PPP

$DDS$ : Digitally deliverable services trade

$LIFE$ : life expectancy rate for men and women

$LIT$ : literacy rate for the whole adult population

$GOV$ : government effectiveness indicator

$DC\_LDC$  is a dummy variable with a value of 0 if the country is a DC and 1 if an LDC.

$\varepsilon$  is an error term

All indicators except for DDS are from World Bank World Development Indicators. DDS is from UNCTADStat. Data for 2020 and 2021 was used.

Table 2 provides the result of the parametric estimations for equation 1 using a Poisson Pseudo Maximum Likelihood (PPML) approach with fixed country and year effects. The full estimates for the country and year fixed effects are available in the annex. The PPML has been employed to account for normality residuals and heteroskedastic biases which occur in OLS models. The results are significant at the 98% confidence interval; however, the sign of life expectancy is counterintuitive. A test was conducted to test for endogeneity and revealed that there was no endogeneity bias between the left-hand side and the right-hand side parameters. Additionally, to ensure the reliability of the findings, two additional tests were conducted: the multicollinearity test and the serial correlation test. The outcomes of these tests reveal a minimal degree of multicollinearity among the independent variables and confirm the absence of autocorrelation between them.

The results indicate that a 10% increase in the value of digital delivered services trade is associated with a 1% improvement in GDP per capita of a country. This finding complements the findings in existing body of literature whereas services export performance contributes to increasing productivity at both the economy and firm

levels, as well as to overall economic growth (François & Hoekman, 2010; Hoekman & Mattoo, 2008).

**Table 3: PPLM coefficient estimates for equation 1**

Variables	Coefficient Estimates	Std.Error	t-value	p-value
log(DDS)	0.10	0.00	65.01	<0.01
log(LIFE)	-1.40	0.04	-32.96	<0.01
log(LIT)	0.21	0.02	10.60	<0.01
log(GOV)	0.25	0.00	59.69	<0.01
DC_LDC	-1.27	0.02	-62.54	<0.01

Source: Author's calculation

### **Endogeneity test**

To assess the presence of endogeneity between digitally deliverables services trade and GDP per capita, the Wu-Hausman test was conducted. The Wu-Hausman test is a statistical test that compares the coefficients estimated in an instrumental variable (IV) regression to those obtained from the PPML regression. The instrumental variable used in the IV regression is the number of employments in the ICT sector. The indicator is from ILOSTAT. We assumed that the variable is uncorrelated to the error term of the PPML regression.

The Wu-Hausman test yielded a p-value of 0.777, indicating that there is no significant evidence of endogeneity. The p-value exceeds the conventional significance level of 0.05, suggesting that the instrumental variable approach effectively addresses the endogeneity concern.

### **Robustness checks**

To ensure the robustness of the analysis, two tests were carried out. The first test employed was the Variance Inflation Factor (VIF) test, which examined the presence of multicollinearity among the independent variables. The second test utilized was the Durbin-Watson test, which assessed the presence of autocorrelation in the residuals of the PPML regression model.

### **Variance Inflation Factor (VIF) test**

To assess multicollinearity among the independent variables, a robustness check was conducted using VIF. VIF measures the extent of multicollinearity in a regression model by quantifying the increase in variance of the estimated regression coefficients due to collinearity among the independent variables.

The VIF results are presented in Table 3.

**Table 4: VIF Results for Multicollinearity Assessment**

Variables	VIF
log(DDS)	1.13
log(LIFE)	1.87
log(LIT)	1.83
log(GOV)	1.54
DC_LDC	1.52

The VIF values for all independent variables are below the threshold of 5, indicating that multicollinearity is not a significant concern in the regression model. VIF values close to 1 suggest little to no multicollinearity, as the variance of the estimated coefficients is not inflated due to collinearity.

The absence of significant multicollinearity strengthens the validity of the regression results, as it indicates that the relationships between the independent variables and the dependent variable can be accurately estimated without substantial bias from collinearity.

### **Durbin-Watson test**

To assess the presence of autocorrelation in the residuals, the Durbin-Watson test was conducted. The Durbin-Watson test is a statistical test that examines autocorrelation in the residuals of the regression model. The Durbin-Watson test yielded a p-value of 0.761.

The p-value obtained from the Durbin-Watson test is greater than the chosen significance level of 0.05, indicating no significant evidence of autocorrelation in the residuals. This suggests that the assumption of independence of the residuals is not violated.

The absence of significant autocorrelation strengthens the validity of the regression results, as it supports the reliability of the estimated coefficients and the statistical significance of the variables.

# PPML coefficient estimates with country and year fixed effects

Variables	Coefficient Estimates	Std.Error	t-value	p-value
log(DDS)	0.10	0.00	65.01	<0.01
log(LIFE)	-1.40	0.04	-32.96	<0.01
log(LIT)	0.21	0.02	10.60	<0.01
log(GOV)	0.25	0.00	59.69	<0.01
DC_LDC	-1.27	0.02	-62.54	<0.01
2006 (fixed effects)	-0.13	0.00	-28.24	<0.01
2007 (fixed effects)	0.12	0.00	30.56	<0.01
2008 (fixed effects)	0.25	0.00	59.88	<0.01
2009 (fixed effects)	0.10	0.00	24.26	<0.01
2010 (fixed effects)	0.19	0.00	47.93	<0.01
2011 (fixed effects)	0.32	0.00	76.34	<0.01
2012 (fixed effects)	0.38	0.00	85.29	<0.01
2013 (fixed effects)	0.37	0.00	81.59	<0.01
2014 (fixed effects)	0.36	0.00	74.01	<0.01
2015 (fixed effects)	0.22	0.00	45.57	<0.01
2016 (fixed effects)	0.19	0.00	38.95	<0.01
2017 (fixed effects)	0.13	0.01	25.25	<0.01
2018 (fixed effects)	0.30	0.00	64.31	<0.01
2019 (fixed effects)	0.32	0.01	57.43	<0.01
2020 (fixed effects)	0.22	0.01	43.25	<0.01
Algeria (fixed effects)	-0.10	0.01	-7.96	<0.01
Angola (fixed effects)	1.02	0.02	48.04	<0.01
Antigua and Barbuda (fixed effects)	1.19	0.01	119.39	<0.01
Argentina (fixed effects)	0.63	0.01	68.19	<0.01
Armenia (fixed effects)	-0.09	0.01	-8.31	<0.01
Aruba (fixed effects)	1.66	0.01	188.77	<0.01
Azerbaijan (fixed effects)	0.09	0.01	9.30	<0.01
Bahrain (fixed effects)	1.47	0.01	158.31	<0.01
Bangladesh (fixed effects)	0.12	0.02	6.15	<0.01
Barbados (fixed effects)	1.05	0.01	93.49	<0.01
Belarus (fixed effects)	0.29	0.01	22.66	<0.01
Benin (fixed effects)	-0.09	0.03	-3.29	<0.01
Bhutan (fixed effects)	1.00	0.02	44.72	<0.01
Bolivia (Plurinational State of) (fixed effects)	-0.77	0.01	-59.25	<0.01
Bosnia and Herzegovina (fixed effects)	0.20	0.01	16.00	<0.01
Botswana (fixed effects)	-0.08	0.02	-4.29	<0.01
Brazil (fixed effects)	0.34	0.01	32.31	<0.01
Brunei Darussalam (fixed effects)	1.74	0.01	170.88	<0.01
Bulgaria (fixed effects)	0.27	0.01	19.41	<0.01
Burkina Faso (fixed effects)	-0.59	0.03	-19.89	<0.01

Variables	Coefficient Estimates	Std.Error	t-value	p-value
Burundi (fixed effects)	-1.28	0.04	-31.03	<0.01
Cabo Verde (fixed effects)	-0.32	0.02	-20.99	<0.01
Cambodia (fixed effects)	-0.14	0.02	-6.22	<0.01
Cameroon (fixed effects)	-1.24	0.02	-62.65	<0.01
Central African Republic (fixed effects)	-0.47	0.04	-11.56	<0.01
Chad (fixed effects)	-0.29	0.05	-5.95	<0.01
Chile (fixed effects)	0.78	0.01	82.99	<0.01
China (fixed effects)	-0.03	0.01	-2.24	0.02
China, Macao SAR (fixed effects)	2.48	0.01	279.67	<0.01
Colombia (fixed effects)	0.05	0.01	5.63	<0.01
Comoros (fixed effects)	0.96	0.03	35.98	<0.01
Congo (fixed effects)	-0.43	0.02	-21.03	<0.01
Costa Rica (fixed effects)	0.60	0.01	56.93	<0.01
Côte d'Ivoire (fixed effects)	-1.02	0.02	-46.84	<0.01
Croatia (fixed effects)	0.86	0.01	73.14	<0.01
Cyprus (fixed effects)	1.59	0.01	151.74	<0.01
Dominican Republic (fixed effects)	0.24	0.01	25.85	<0.01
Ecuador (fixed effects)	0.23	0.01	26.20	<0.01
Egypt (fixed effects)	-0.81	0.01	-59.18	<0.01
El Salvador (fixed effects)	-0.27	0.01	-27.62	<0.01
Equatorial Guinea (fixed effects)	1.24	0.02	68.84	<0.01
Eswatini (fixed effects)	-0.40	0.02	-19.59	<0.01
Ethiopia (fixed effects)	-0.34	0.04	-8.37	<0.01
Gabon (fixed effects)	0.56	0.02	35.60	<0.01
Gambia (fixed effects)	-0.28	0.03	-8.12	<0.01
Georgia (fixed effects)	-0.13	0.01	-10.84	<0.01
Ghana (fixed effects)	-1.29	0.02	-71.22	<0.01
Greece (fixed effects)	1.53	0.01	162.73	<0.01
Guatemala (fixed effects)	-0.25	0.01	-20.01	<0.01
Guinea (fixed effects)	-0.21	0.03	-6.90	<0.01
Guinea-Bissau (fixed effects)	-0.04	0.05	-0.98	0.33
GuineaBissau (fixed effects)	-0.03	0.05	-0.75	0.45
Haiti (fixed effects)	-0.43	0.03	-14.38	<0.01
Honduras (fixed effects)	-0.68	0.01	-61.58	<0.01
Hungary (fixed effects)	0.58	0.01	46.75	<0.01
India (fixed effects)	-1.78	0.02	-87.46	<0.01
Indonesia (fixed effects)	-0.81	0.01	-68.52	<0.01
Iran (Islamic Republic of) (fixed effects)	0.16	0.01	16.31	<0.01
Iraq (fixed effects)	0.21	0.01	16.11	<0.01
Jamaica (fixed effects)	-0.16	0.02	-9.84	<0.01
Jordan (fixed effects)	-0.32	0.01	-31.32	<0.01
Kazakhstan (fixed effects)	0.38	0.01	35.48	<0.01
Kenya (fixed effects)	-1.48	0.02	-73.71	<0.01

Variables	Coefficient Estimates	Std.Error	t-value	p-value
Korea, Republic of (fixed effects)	1.26	0.01	108.88	<0.01
Kuwait (fixed effects)	2.06	0.01	243.48	<0.01
Kyrgyzstan (fixed effects)	-1.14	0.02	-59.08	<0.01
Lao People's Dem. Rep. (fixed effects)	0.40	0.02	18.31	<0.01
Latvia (fixed effects)	0.87	0.01	85.88	<0.01
Lebanon (fixed effects)	0.42	0.01	39.05	<0.01
Lesotho (fixed effects)	-0.54	0.03	-19.25	<0.01
Lithuania (fixed effects)	0.88	0.01	74.70	<0.01
Madagascar (fixed effects)	-0.92	0.03	-32.81	<0.01
Malaysia (fixed effects)	0.33	0.01	31.75	<0.01
Maldives (fixed effects)	0.83	0.01	78.31	<0.01
Mali (fixed effects)	-0.36	0.03	-13.02	<0.01
Mauritania (fixed effects)	0.46	0.02	19.81	<0.01
Mauritius (fixed effects)	0.44	0.01	47.82	<0.01
Mexico (fixed effects)	0.43	0.01	46.69	<0.01
Moldova, Republic of (fixed effects)	-0.47	0.02	-23.57	<0.01
Mongolia (fixed effects)	-0.29	0.02	-18.94	<0.01
Montenegro (fixed effects)	0.55	0.01	50.09	<0.01
Morocco (fixed effects)	-0.61	0.01	-46.64	<0.01
Mozambique (fixed effects)	-0.94	0.03	-31.63	<0.01
Myanmar (fixed effects)	0.00	0.03	0.01	0.99
Namibia (fixed effects)	-0.15	0.02	-8.65	<0.01
Nepal (fixed effects)	-0.15	0.03	-5.18	<0.01
Nicaragua (fixed effects)	-0.67	0.02	-33.21	<0.01
Niger (fixed effects)	-0.75	0.04	-21.40	<0.01
Nigeria (fixed effects)	-1.15	0.02	-47.46	<0.01
North Macedonia (fixed effects)	-0.04	0.01	-2.80	<0.01
Oman (fixed effects)	1.30	0.01	153.63	<0.01
Pakistan (fixed effects)	-1.55	0.02	-92.39	<0.01
Panama (fixed effects)	0.88	0.01	93.76	<0.01
Paraguay (fixed effects)	0.45	0.01	45.80	<0.01
Peru (fixed effects)	0.12	0.01	12.84	<0.01
Philippines (fixed effects)	-1.02	0.01	-73.90	<0.01
Poland (fixed effects)	0.68	0.01	52.63	<0.01
Portugal (fixed effects)	1.24	0.01	121.26	<0.01
Qatar (fixed effects)	2.62	0.01	315.74	<0.01
Russian Federation (fixed effects)	0.35	0.01	28.70	<0.01
Rwanda (fixed effects)	-0.58	0.02	-23.82	<0.01
Samoa (fixed effects)	-0.03	0.01	-2.26	0.02
Saudi Arabia (fixed effects)	1.21	0.01	126.78	<0.01
Senegal (fixed effects)	0.08	0.02	3.45	<0.01
Serbia (fixed effects)	0.14	0.01	12.47	<0.01
Seychelles (fixed effects)	1.03	0.01	107.90	<0.01

Variables	Coefficient Estimates	Std.Error	t-value	p-value
Sierra Leone (fixed effects)	-0.55	0.04	-15.45	<0.01
Solomon Islands (fixed effects)	0.89	0.03	29.22	<0.01
South Africa (fixed effects)	-0.14	0.01	-10.53	<0.01
Sri Lanka (fixed effects)	-0.33	0.01	-32.76	<0.01
Sudan (fixed effects)	-1.25	0.04	-31.51	<0.01
Suriname (fixed effects)	0.46	0.01	37.73	<0.01
Tajikistan (fixed effects)	-1.28	0.03	-49.63	<0.01
Tanzania, United Republic of (fixed effects)	-0.53	0.02	-21.41	<0.01
Thailand (fixed effects)	-0.22	0.01	-19.13	<0.01
Togo (fixed effects)	-0.39	0.02	-15.98	<0.01
Tonga (fixed effects)	0.12	0.01	8.85	<0.01
Tunisia (fixed effects)	-0.15	0.01	-14.72	<0.01
Türkiye (fixed effects)	0.53	0.01	57.87	<0.01
Uganda (fixed effects)	-0.76	0.02	-31.86	<0.01
Ukraine (fixed effects)	-0.52	0.02	-28.12	<0.01
United Arab Emirates (fixed effects)	1.72	0.01	153.23	<0.01
Uruguay (fixed effects)	0.95	0.01	117.00	<0.01
Uzbekistan (fixed effects)	-0.67	0.01	-53.39	<0.01
Vanuatu (fixed effects)	1.03	0.02	50.16	<0.01
Venezuela (Bolivarian Rep. of) (fixed effects)	0.97	0.01	84.59	<0.01
Viet Nam (fixed effects)	-0.81	0.02	-48.23	<0.01
Zimbabwe (fixed effects)	-1.28	0.03	-48.03	<0.01





The Asia-Pacific Research and Training Network on Trade - ARTNeT - is an open network of research and academic institutions and think-tanks in the Asia-Pacific region. Since its inception, ARTNeT aims to increase the amount of high quality, topical and applied research in the region by harnessing existent research capacity and developing new capacities. ARTNeT also focuses on communicating these research outputs for policymaking in the region including through the ARTNeT Working Paper Series which provide new and policy-relevant research on topics related to trade, investment and development. The views expressed in this publication are those of the authors and do not necessarily reflect the views of the United Nations and ARTNeT secretariat or ARTNeT members.

Readers are encouraged to quote or reproduce material from ARTNeT Working Papers for their own publications, but as the copyright holder, ARTNeT requests due acknowledgement and a copy of the publication.

This and other ARTNeT publications are available from [artnet.unescap.org](http://artnet.unescap.org)



ARTNeTontrade



@ARTNeTontrade



ARTNeT Group



[artnetontrade@un.org](mailto:artnetontrade@un.org)

ARTNeT Secretariat, United Nations ESCAP

Rajadamnern Nok Avenue

Bangkok 10200, Thailand

Tel: +66(0) 22881425

Fax: +66(0) 22881027