

The impact of digital trade facilitation / paperless trade on the environment

by

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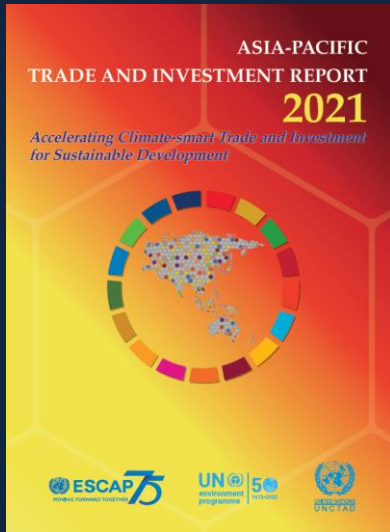
for Asia and the Pacific



UNITED NATIONS
ESCAP

Economic and Social Commission for Asia and the Pacific





www.unescap.org/kp/APTIR2021

Asia-Pacific Trade and Investment Report on *Accelerating climate-smart trade and investment for sustainable development*

How can trade and investment-related policies be more “climate-smart” - and help address climate change?

Effects of trade and investment on GHG emissions is complex – no simple answers and better data needed



Direct effect

- GHG emissions due to transportation and trade procedures



Scale effect

- GHG emissions due to increased economic activity



Regulatory effect

- Effect of trade on adoption of certain climate-related policies



Composition effect

- GHG emissions due to production structure



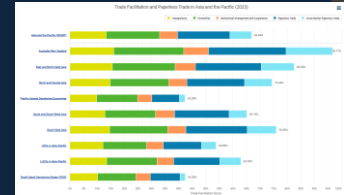
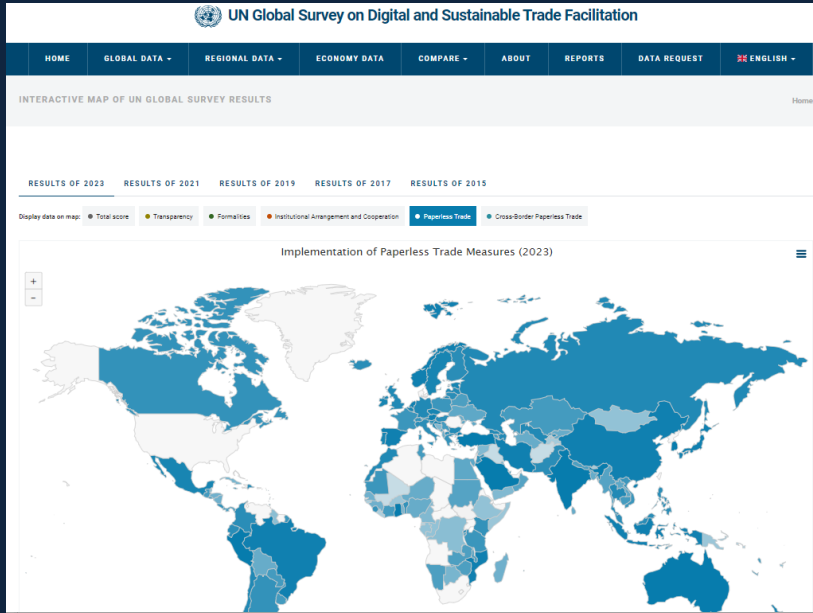
Technique effect

- Spread of climate-smart products and technology



APTIR 2021 Recommendation 5: Accelerate trade digitalization

“Each single end-to-end trade transaction undertaken fully digitally could save emissions equivalent to planting 1.5 trees. For the whole of Asia-Pacific, this implies savings of about 13 million tons of CO2 annually, equivalent to the carbon absorbed by 400 million trees.”



2023 UN TF Global Report
Launch: 15 Sep 2023
www.untfsurvey.org



Climate change and trade facilitation: Estimating GHG Emission Savings from paperless trade implementation

Article

Climate Change and Trade Facilitation: Estimating Greenhouse Gas Emission Savings from Implementation of Cross-Border Paperless Trade in Asia and the Pacific

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Yann Duval¹ and Simon Hardy²

Abstract

The Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia and the Pacific entered into force in February 2021. While economic benefits associated with paperless trade facilitation are well known, little attention has been paid to measuring the potential environmental benefits. Accordingly, this article sets out to quantify the amount of greenhouse gas emissions that could be saved if all trade-related paper documents in the region are ultimately replaced by digital documents and data exchange, as foreseen in the regional framework agreement. This is carried out by combining detailed descriptions of trade transactions, data on trading volumes and relevant emission factors. Even with conservative assumptions, the emissions saved by fully digitalising a single end-to-end trade transaction are equivalent to planting 1.5 trees. For the Asia-Pacific, this implies savings of about 13 million tons of CO₂e annually, equivalent to the carbon absorbed by 400 million trees. The results are driven by efficiency gains from handling data digitally rather than by the direct savings of paper and ink.

JEL Codes: F18, H83, Q56

Keywords

International trade, trade facilitation, environment, digitisation, climate change

¹ Trade Policy and Facilitation Section, Trade, Investment and Innovation Division, UN ESCAP, Bangkok, Thailand.

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Context

- SDGs and climate change crisis
- Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia-Pacific (UN treaty entered into force 2021)
- Economic and inclusiveness potential of trade facilitation (the simplification and digitalization of trade procedures) well known
- Environmental impact of trade procedures not tracked / quantified

<https://doi.org/10.1177%2F26316846211035567>;

See also earlier ARTNet WP (May 2021) at: <https://artnet.unescap.org/index.php/publications/working-papers/primer-quantifying-environmental-benefits-cross-border-paperless-trade>



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Key results

- Fully digitalizing a single end-to-end trade transaction = emission savings of 1.5 trees
- For Asia-Pacific, equivalent to about 13 million tons of CO₂e per year (400 million trees)
- Results driven by efficiency gains from handling data digitally rather than by direct savings of paper/ink.

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Climate change and trade facilitation:

Estimating GHG Emission Savings from paperless trade implementation

Table 1. Channels Through Which Implementing Paperless Trade Affects Greenhouse Gas Emissions.

Elimination of physical documents	+Elimination of physical documents, requiring: <ul style="list-style-type: none">• paper,• ink and• electricity for printer
Replacement of physical delivery	+Reduced number of deliveries required to complete trade transactions.+Elimination of physical delivery, requiring: <ul style="list-style-type: none">• fuel for courier transport and• envelope –Replaced by digital data exchange, requiring electricity for: <ul style="list-style-type: none">• router,• networks and• servers
Productive hours	+Reduced productive hours required to complete procedures.Affects emissions associated with office labour (commute, office equipment, lighting, temperature control, other)
Storage time	+Reduced cargo storage time, affecting emissions from lighting, cargo handling, temperature control, refrigerants

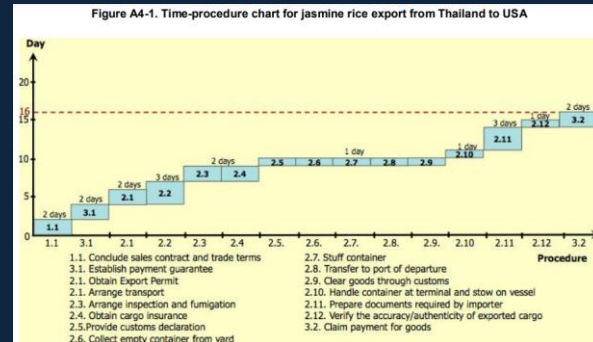
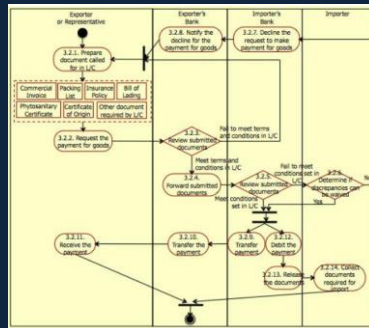
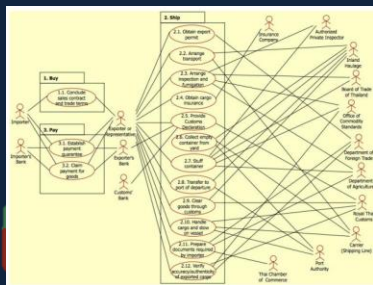
Source: The authors.



Climate change and trade facilitation:

Estimating GHG Emission Savings from paperless trade implementation

- Overview of Methodology (1)
 - Identify a “typical” transaction
 - Based on 20+ Business Process Analysis (BPA) studies of import/export procedures in Asia-Pacific
 - Scope: BUY-SHIP-PAY (transport of goods not included)
 - » No of stakeholders: 13.3
 - » No of paper documents: 46.4 (including 22 copies)
 - » Trade transaction time: 19.7 days



Climate change and trade facilitation:

Estimating GHG Emission Savings from paperless trade implementation

- Overview of Methodology (2)
 - For each transaction process/activity
 - Identify and estimate change in inputs saved when moving to fully paperless trade.
 - Calculate GHG savings for each process, based on emission factors associated with each input
 - Sum to arrive at GHG savings per trade transaction
 - Scale to national, regional or global level
 - Assuming average transaction size of USD 50,000



Climate change and trade facilitation:

Estimating GHG Emission Savings from paperless trade implementation


- Limitations
 - Strong assumptions made due to lack of data
 - e.g. emission factors apply to transactions in all countries
- Results very much exploratory



Table 4. Emission Factors.

Input	Assumptions/Parameters	Factors	Sources
Paper	5% recycling rate	8.98 g CO ₂ e/g	Environmental Paper Network (2021) See Schultz and Suresh (2018) for methodology.
	Uncoated freesheets A4, 100-gsm thickness, 6.25 g/page	unrecycled paper 3.81 g CO ₂ e/g recycled paper	
Ink	1 gram of ink on average covers 12.6 pages (10% coverage rate, average of data on 44 cartridges, with data from InkPedia, 2021) ^a	2.5 g CO ₂ /g ink	Amon-Tran et al. (2012)
Printer electricity	400 W, assume 90% efficiency. A total of 30 seconds of use per page	497 g CO ₂ e/kWh	EnergyUseCalculator (2021) Carbon Footprint TM (2020)
Document delivery	Journey using motorcycle courier service	0.11551 kg CO ₂ e/km	BEIS (2020)
Network/server electricity	A total of 10 W/hour for network/data centres, 5 W/ hour for router, 90% efficiency	497 g CO ₂ e/kWh	Ericsson (2020) Carbon Footprint TM (2020)
Productive work hours	Office environment with heating/cooling system	1389.4 g CO ₂ /hour	Tenhunen and Penttinen (2010)
Storage facilities	Stored in ambient logistics site A total of 20 tons average shipment size	5.4 kg CO ₂ e/t in ambient storage ^b	Dobers and Rüdiger (2019)
Offsetting	NA	31.5 kg CO ₂ e/tree offset	Encon (2021)

Table 5. Emissions Saved from Implementing Cross-Border Paperless Trade.

Estimated emissions saved per transaction (gCO ₂ e)	Average	Low	High
Paper	3,814	1,562	7,041
Ink	14	6	26
Transport (of documents)	3,509	850	7,381
Printer	129	53	238
Storage	10,240	918	41,731
Productive hours	30,098	16,346	62,857
Estimated emission savings	47,804	19,734 	119,273
Trees required to match these savings in a year	1.5	0.6	3.8
Aggregate Estimates (metric tons CO₂e)			
Asia-Pacific estimated emission savings	12,984,573	5,360,132	32,397,150
Trees required to match these savings in a year	412,208,662	170,162,923	1,028,480,951

Source: The authors.

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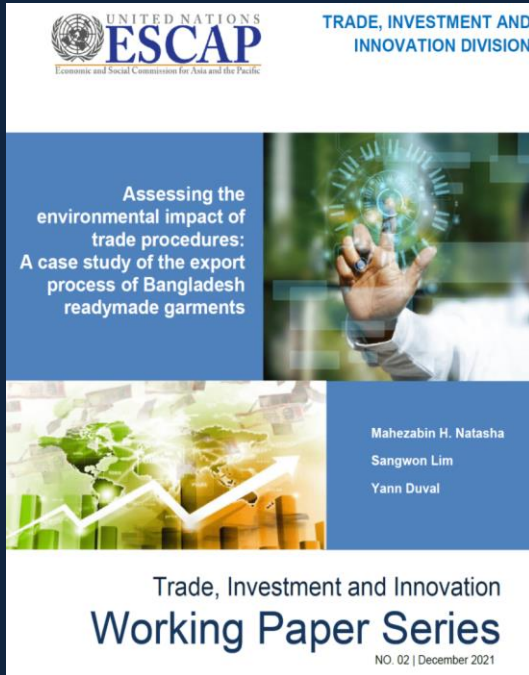
Climate change and trade facilitation:

Estimating GHG Emission Savings from paperless trade implementation

- Conclusion & way forward
 - Significant climate change mitigation benefits of trade facilitation and paperless trade on a per transaction basis
 - Useful to decrease the “direct effect” of trade on the environment, but trade facilitation also has a “scale effect” (increased number of transactions → increased trade and economic activity)
 - But GHG emission savings from paperless trade remain small compared to emissions from international transport of goods → need to specifically target transport emissions
 - “global emission-saving estimates from paperless trade implementation represent only 1.1% of the emissions from fuel used in global supply chains (Duval and Hardy, 2021)”
- More studies (and primary data collection) required to assess robustness of estimates presented



Environmental impact of the export process of Bangladesh readymade garments



- Extends BPA methodology to environmental impact assessment
 - Primary data collected from exporters
- Environmental impact of “as-is” process measured in terms of
 - GHG emissions,
 - waste generation and
 - water usage
- → **confirms importance and potential to reduce environmental impact through trade digitalization**

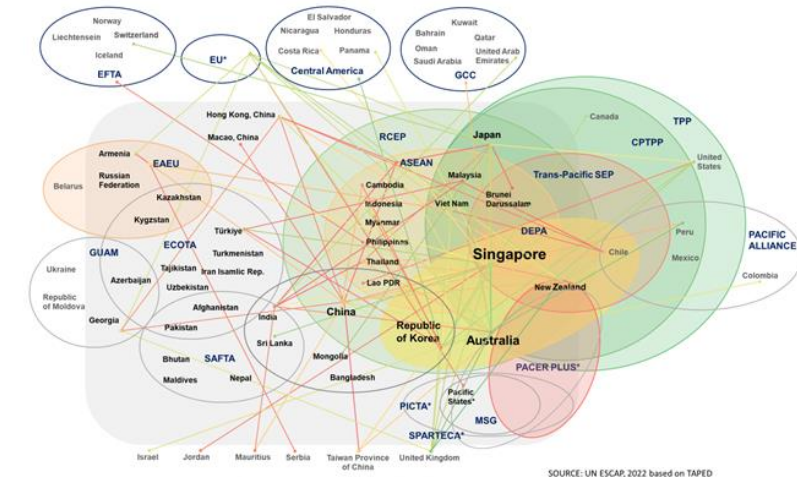


<https://www.unescap.org/kp/2021/assessing-environmental-impact-trade-procedures-case-study-export-process-bangladesh#>

Looking forward: International law on digital trade / e-commerce likely to continue to evolve quickly...

Preferential Trade Agreements (PTAs) with digital trade / e-commerce provisions in Asia-Pacific

[Any color = Substantial e-commerce provisions; Greener color = Substantial and binding e-commerce provisions]



SOURCE: UN ESCAP, 2022 based on TAPED

*Not all members shown / Plurilateral PTAs not represented: D-8 PTA, GSTP, PTN, and TPS/OIC.
 The line and circle represent signed and entry into force agreements with e-commerce provisions/chapters.
 The color indicates the degree of legalization. Specifically, the line and circle with a red color refers to e-commerce agreements inclusive of a substantial number of provisions with non-binding obligations, while the line and circle with a green color refers to e-commerce agreements inclusive of a substantial number of provisions with binding obligations.
 The economy listed under a grey rectangle shape refers to ESCAP members and associate members.
 Note: Economy that have signed more number trade agreements with e-commerce provisions/chapters despite the extent of legalization is presented in a bigger font.

... Let's ensure digital trade is also sustainable trade!





Trade Facilitation & Digital Trade

www.unescap.org/our-work/trade-investment-innovation

THANK YOU

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