Digital trade for macroeconomic development:

Evidence from ASEAN's cross-border e-commerce integration

John Paolo R. Rivera, Ph.D.

Senior Research Fellow, Philippine Institute for Development Studies

28 October 2025 | Tokyo, Japan

Philippine Institute for Development Studies
Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas

ASEAN’s digital transformation

- ASEAN: one of the world’s fastest-growing digital economies.
- 2023 digital economy value: USD 200B, projected to exceed USD 330B by 2025 (Google et al., 2023; Sefrina, 2024).
- Growth expected to hit USD 1 trillion by 2030, driven by youth demographics and connectivity (Yang, 2023; WEF, 2025).
- Cross-border e-commerce (CBEC) plays a pivotal role in enabling MSMEs to access regional and global markets (Carlos et al., 2022).
- Digital trade is represented by CBEC in this study.

The role of CBEC

- CBEC as a catalyst for inclusive trade and digital integration.
- Platforms such as Lazada and Shopee revolutionized regional trade logistics and access.
- During COVID-19: CBEC mitigated supply disruptions and sustained MSME activity (Hijanto, 2020; Salisu et al., 2025).
- CBEC is now a key component of ASEAN's Digital Economy Framework Agreement (DEFA).

Uneven digital landscape

- Persistent infrastructure and skills gaps across ASEAN (Zhang et al., 2025).
- Regulatory fragmentation: differing e-payment, taxation, and data protection policies.
- Digital literacy disparities between urban and rural populations (Hariyani et al., 2025).
- Inclusion challenge: MSMEs and vulnerable sectors remain underrepresented in CBEC participation.

Macroeconomic relevance of CBEC

- CBEC influences GDP growth, current account balance, and economic resilience (Beirne & Fernandez, 2020).
- Yet, its macroeconomic implications in ASEAN remain underexplored.
- This study bridges micro-level digital transformation with macro-level economic outcomes.

Regional policy context

- ASEAN DEFA: Blueprint for digital economy cooperation.
- ADII (ASEAN Digital Integration Index) measures progress in digital integration across six pillars.
- Key policy question: How does CBEC participation translate into macroeconomic development and resilience?

Research questions

- Which digital trade enablers drive macroeconomic development in ASEAN?
- How can regional digital trade policies be recalibrated toward inclusive and stable growth?
- Study objectives:
  - Analyze the link between CBEC performance and macroeconomic indicators (GDP growth, current account balance).
  - Identify key digital enablers influencing macroeconomic development across ASEAN Member States.
  - Propose policy recommendations to harmonize digital trade frameworks for regional macroeconomic growth.

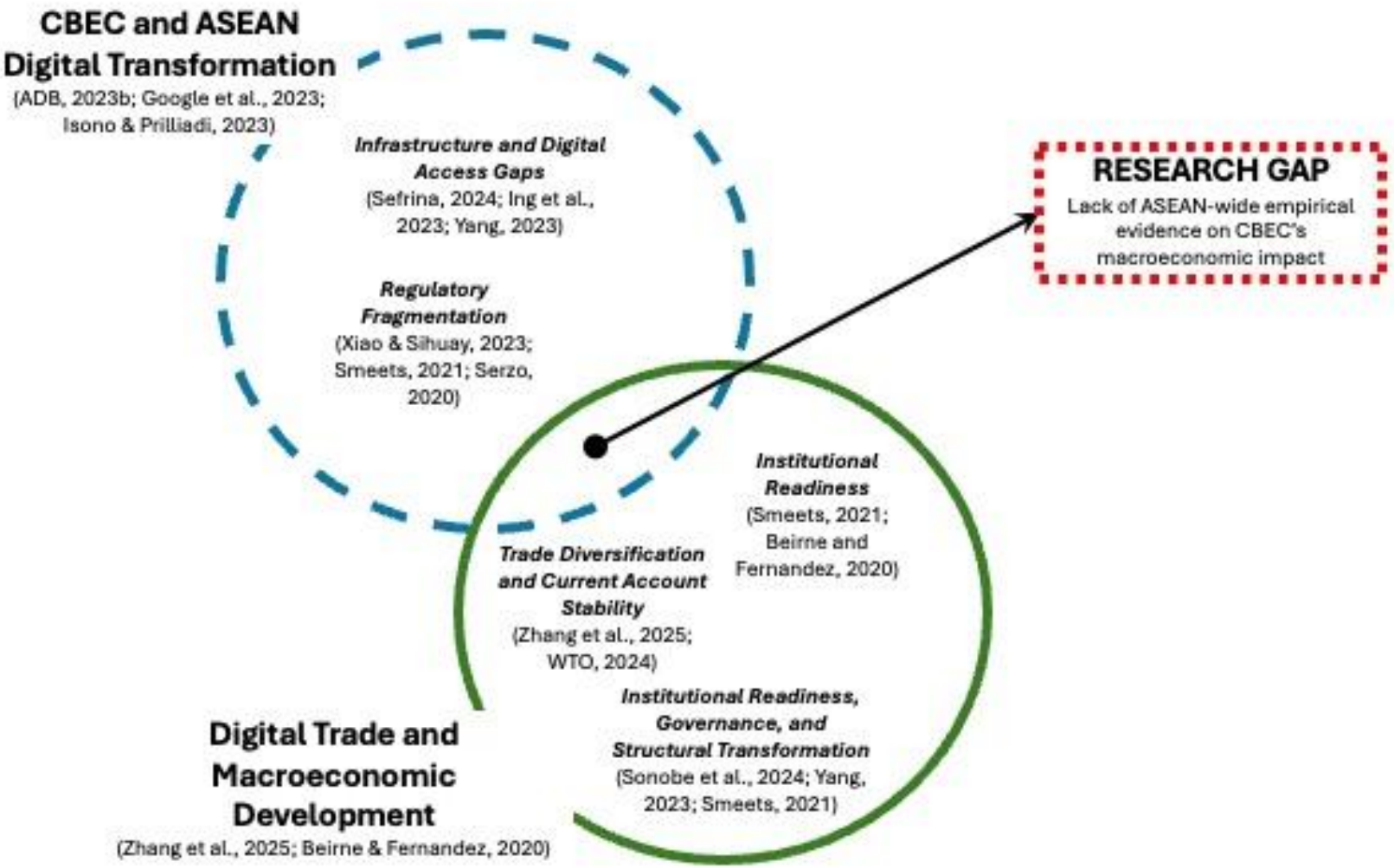
Research contribution

- Provides the first empirical link between CBEC participation and macroeconomic outcomes in ASEAN.
- Extends discourse on CBEC and resilience beyond trade facilitation to economic stability.
- Offers evidence-based insights for policy alignment between national digital strategies and ASEAN DEFA.

Value added for policymakers

- Informs ASEAN Secretariat, national governments, and development institutions on:
- How CBEC can be leveraged for sustained growth.
- What structural reforms are most impactful (skills, logistics, governance).
- How to recalibrate CBEC policies for inclusive and resilient economies.

Literature review



Conceptual framework

Hypothesis

1

Digital trade enablers (ADII) lead to increased CBEC participation.

2

Increased CBEC participation contributes positively to macroeconomic development.

Core components

Construct	Possible representation	Reference
Digital trade enablers	Public infrastructure (broadband penetration, digital ID, mobile payments)	Hariyani et al. (2025)
	Regulatory frameworks (cross-border data rules, cybersecurity, tax harmonization)	Yang (2023); Smeets (2021)
	Institutional mechanisms (regional agreements and support programs)	Sefrina (2024); Ing et al. (2023)
CBEC participation	Volume of digital exports/imports; platform-based SME integration; inclusion metrics (participation by women, rural enterprises, and low-income groups)	Carlos et al. (2022)
Macroeconomic development	GDP growth stability	Beirne and Fernandez (2020);
	current account balance performance	Zhang et al. (2025); Shirakawa (2024)
	employment elasticity in digital trade sectors	Chen and Xu (2024); Serafica and Albert (2018)
	reduction in inequality proxies (e.g., Gini coefficient, rural-urban income gaps)	Hariyani (2025); Smeets (2021)

ASEAN Digital Integration Index

Table 2. *Construct-variable matching and description.*

Construct	Variable / Code	Variable Description	Variable Justification
Digital trade enablers ($ADIIPX_{it}$)	ASEAN Digital Integration Index (ADII) ***ADIIPX***$_{it}$	Composite scores across digital readiness pillars, which is a measurement tool developed to assess and track the progress of digital integration across ASEAN, and its trading partners (ASEAN Secretariat, 2021).	Each ADII pillar captures a critical enabler of ASEAN's digital economy. Collectively, they give a holistic picture of how ready each AMS is to integrate into a unified regional digital economy (ASEAN Secretariat, 2021).
	ADII Pillar 1: Digital Trade and Logistics ***ADIIP1***$_{it}$	Measures how well AMS enable cross-border digital trade through logistics efficiency, trade facilitation, customs digitalization, and cross-border interoperability; focuses on reducing barriers to CBEC and digital supply chains (ASEAN Secretariat, 2021).	
	ADII Pillar 2: Data Protection and Cybersecurity ***ADIIP2***$_{it}$	Tracks the development of data governance frameworks, privacy protection laws, and cybersecurity readiness; ensures trust in digital transactions and safeguards personal and business data (ASEAN Secretariat, 2021).	
	ADII Pillar 3: Digital Payments and Identities ***ADIIP3***$_{it}$	Looks at adoption and interoperability of digital payment systems, e-money, and fintech solutions; considers the existence of digital identity systems that allow seamless authentication for services and trade (ASEAN Secretariat, 2021).	
	ADII Pillar 4: Digital Skills and Talent ***ADIIP4***$_{it}$	Measures the availability and quality of digital literacy, information and communication technology (ICT) skills, and workforce readiness for a digital economy; reflects investments in education, training, and human capital development (ASEAN Secretariat, 2021).	
	ADII Pillar 5: Innovation and Entrepreneurship ***ADIIP5***$_{it}$	Evaluates support for start-ups, innovation ecosystems, and R&D capacity; focuses on how conducive the environment is for digital entrepreneurship, creative industries, and new technologies (ASEAN Secretariat, 2021).	
	ADII Pillar 6: Institutional and Infrastructural Readiness ***ADIIP6***$_{it}$	Covers broadband access, connectivity infrastructure, and policy and regulatory frameworks that enable digital integration; reflects government coordination, regulatory efficiency, and investment in foundational digital public infrastructure (ASEAN Secretariat, 2021).	

Empirical framework

Variable		Description	Unit of analysis	Coverage	Source
$ADIIP1\_DDS_{it}$		Digital Development Score	index	2021, 2023	World Bank's World Development Indictors [1]
$ADIIP4\_DIC_{it}$		Digital Innovation Capacity	score	2011-2024	World Intellectual Property Organization (WIPO) Global Innovation Index (GII) Report[2]
$ADIIP6\_FBS_{it}$		Fixed Broadband Subscription	per 100 population	1998-2024	World Bank's World Development Indictors[3]
$RGDPAG_i$		Real GDP Annual Growth	%	1960-2024	World Bank's World Development Indictors[4]
$CABGDP_i$		Current Account Balance	% of GDP	1960-2024	World Bank's World Development Indictors[5]
$DDSTRD_{it}$	$DDSEXP_{it}$	Exports of Digitally Delivered Services	% of total trade in services	2010-2023	UNCTAD Data Hub[6]
	$DDSIMP_{it}$	Imports of Digitally Delivered Services	% of total trade in services	2010-2023	

Empirical framework

$$DDSTRD_{it} = \alpha_0 + \alpha_i \sum_{i=1}^{j} ADIIPX_{it} + \varepsilon_{it}$$	(1)
$$RGDPAG_{it} = \beta_0 + \beta_1 \widehat{DDSTRD}_{it} + \varepsilon_i$$	(2)
$$CABGDP_{it} = \beta_0 + \beta_1 \widehat{DDSTRD}_{it} + \varepsilon_i$$	(3)
$$DDSTRD_i = \alpha_0 + \alpha_i \sum_{i=1}^{j} ADIIPX_{it} + \beta_i \sum_{i=1}^{k} DVRGEB_{it} + \gamma_i \sum_{t=2}^{T} DVYEAR_{it} + \varepsilon_{it}$$	(4)
$$DDSEXP_{it} = \alpha_0 + \alpha_1 ADIIP1\_DDS_{it} + \alpha_2 ADIIP4\_DIC_{it} + \alpha_3 ADIIP6\_FBS_i + \beta_1 ASEAN_{it} + \beta_2 RCEP_{it} + \beta_3 BRICS_{it} + \beta_4 CPTPP_{it} + \beta_5 G20_{it} + \gamma_2 DVYEAR_{i2023} + \varepsilon_{it}$$	(5)
$$DDSIMP_{it} = \alpha_0 + \alpha_1 ADIIP1\_DDS_i + \alpha_2 ADIIP4\_DIC_{it} + \alpha_3 ADIIP6\_FBS_i + \beta_1 ASEAN_{it} + \beta_2 RCEP_{it} + \beta_3 BRICS_{it} + \beta_4 CPTPP_{it} + \beta_5 G20_{it} + \gamma_2 DVYEAR_{i2023} + \varepsilon_{it}$$	(6)
$$RGDPAG_{it} = \beta_0 + \beta_1 \widehat{DDSEXP}_{it} + \varepsilon_i$$	(7)
$$RGDPAG_{it} = \beta_0 + \beta_1 \widehat{DDSIMP}_{it} + \varepsilon_i$$	(8)
$$CABGDP_{it} = \beta_0 + \beta_1 \widehat{DDSEXP}_{it} + \varepsilon_i$$	(9)
$$CABGDP_{it} = \beta_0 + \beta_1 \widehat{DDSIMP}_{it} + \varepsilon_i$$	(10)

Results and discussion (descriptives)

Dataset and analytical focus

- Covers ASEAN, RCEP, BRICS, CPTPP, and G20 economies
- Indicators: ADII Pillars, GDP Growth, Current Accounts, DDS Trade
- Objective: Describe heterogeneity in digital readiness and economic outcomes

Variation in ASEAN digital trade enablers

- High performers: Singapore, Malaysia, Thailand – strong in Pillars 1 & 6
- Laggards: Cambodia, Lao PDR, Myanmar – persistent structural gaps

Macroeconomic outcomes

- ASEAN's GDP growth > advanced economies (2021 and 2023)
- Vietnam and Philippines: robust expansion
- Myanmar: contraction due to political instability
- Brunei Darussalam and Singapore: current account surpluses
- Cambodia and Philippines: current account deficits

Results and discussion (descriptives)

Digital Delivery Services (DDS) trade patterns

- Thailand, Vietnam, Philippines: high DDS export shares (ICT-enabled sectors)
- Cambodia, Myanmar: low integration
- Singapore, Thailand: leaders in DDS imports

Cross-regional comparison

- Non-ASEAN RCEP: stronger infrastructure and skills
- BRICS: India leads in DDS exports, Brazil/South Africa moderate
- CPTPP and G20: advanced economies dominate in Pillars 4 and 6
- Key observation: ASEAN's digital divide vs. mature economies

ASEAN's dual reality

- Strengths: Dynamic GDP growth; rising DDS participation
- Gaps: Skills mismatch and uneven digital capacity; institutional and infrastructure gaps
- Challenge: Leverage digital trade to sustain macroeconomic development

Results and discussion (hypothesis 1)

- **Impact of Digital Trade Enablers on DDS Exports**
  - ADIIP4 (Skills & Talent): Strongest positive predictor (*1% sig.*)
  - ADIIP1 (Trade & Logistics): Positive, smaller effect (5% sig.)
  - ADIIP6 (Infrastructure): Significant negative association (*1% sig.*)
  - 2023 Dummy: Strong negative effect → global digital slowdown
  - R^2 = 0.55–0.70: Moderate explanatory power
- **ASEAN Subsample (DDS Exports)**
  - ADIIP4 (Skills): Positive, highly significant → need for workforce upskilling
  - ADIIP1 (Logistics): Positive but not significant → uneven trade facilitation
  - ADIIP6 (Infrastructure): Negative, significant → affordability & quality gaps persist
  - 2023 Dummy: Negative → regional vulnerability
  - ASEAN Dummy: Positive but insignificant → latent potential untapped
  - Conclusion: Connectivity is not competitiveness; institutional innovation crucial.

Cross comparison of results and discussion (hypothesis 1)

Bloc	Main Driver	Key Insight
ASEAN	Skills (ADIIP4)	Upskilling needed for export competitiveness
RCEP	Logistics (ADIIP1)	Supply chain efficiency amplifies exports
BRICS	Skills & Logistics	Parallel improvement in both required
CPTPP	Skills	Consistent with innovation focus
G20	Skills; Scale Effects	Policy coherence, absorptive capacity

Takeaway: *Different blocs, different binding constraints*.

Results and discussion (hypothesis 1)

- **Impact of Digital Trade Enablers on DDS Imports**
  - ADIIP1 (Logistics): Strongest positive predictor (*1% sig.*)
  - ADIIP4 (Skills): Positive, significant (moderate effect)
  - ADIIP6 (Infrastructure): Negative, insignificant
  - 2023 Dummy: Strong negative; global DDS import slowdown
  - R^2 = 0.46–0.57: Moderate fit
- **ASEAN Subsample (DDS Imports)**
  - ADIIP1: Positive and significant; logistics as primary constraint
  - ADIIP4: Positive but not significant; less of a bottleneck
  - ADIIP6: Negative, insignificant; infrastructure saturation effect
  - 2023 Dummy: Strongly negative; heightened exposure to shocks
  - Conclusion: ASEAN's CBEC participation depends on trade facilitation and connectivity.

Cross comparison of results and discussion (hypothesis 1)

Bloc	Main Determinant	Policy Implication
ASEAN	Logistics	Improve customs, supply chains
RCEP	Logistics	Leverage regional digital trade agreements
BRICS	Logistics and Skills	Build dual capacity
CPTPP	Skills	Heterogeneity; innovation focus
G20	Skills	Human capital, innovation ecosystems

Takeaway: *Different blocs, different binding constraints*.

Integrative insights (hypothesis 1)

DDS Exports:	DDS Imports:	Across All Samples:
• Driven by **Skills (ADIIP4)** • Logistics secondary • Infrastructure non-linear (negative)	• Driven by **Logistics (ADIIP1)** • Skills supportive • Infrastructure non-significant	• 2023 = contraction year • Infrastructure ≠ trade without institutional and innovation support

Results and discussion (hypothesis 2)

Impact of Digital Trade Enablers on GDP Growth

- DDS exports positively affect real GDP growth (significant).
- Stronger in ASEAN and RCEP than in advanced blocs.
- 2023 dummy: negative globally, positive for emerging economies.
- R^2 range: 0.17–0.38; moderate explanatory power.
- Interpretation: CBEC exports support growth through productivity and innovation (WTO, 2023; Ing et al., 2023).

ASEAN Subsample (DDS Exports on GDP Growth)

- Stronger positive effect: CBEC critical for ASEAN output expansion.
- 2023 dummy: significant negative; post-pandemic slowdown.
- Insight: CBEC as a growth catalyst for emerging AMS markets (ASEAN Secretariat, 2021).
- Implication: Need to sustain digital export competitiveness amid external shocks.

Cross comparison of results and discussion (hypothesis 2)

Bloc	Main effect	Key insight
ASEAN	Strong positive	Growth driver but vulnerable to shocks
RCEP	Strongest positive	Integration amplifies digital gains
BRICS	Moderately positive	Emerging economy resilience
CPTPP	Weak	Advanced economies face diminishing returns
G20	Insignificant	Mature markets, limited growth effects

Takeaway: Digital export growth yields higher returns for developing economies.

Results and discussion (hypothesis 2)

Impact of Digital Trade Enablers on Current Account Balance

- DDS exports have a weakly positive effect on external balances.
- Stronger for emerging economies; weaker or negative for G20.
- 2023 dummy: Negative and significant for G20; slowdown impact.
- Interpretation: Export-led growth ≠ guaranteed external stability (Beirne & Fernandez, 2020).
- Implication: Digital trade supports GDP more than current account resilience.

ASEAN and RCEP Subsamples (DDS Exports on Current Account Balance)

- ASEAN: Positive but insignificant; short-run limits on external benefits.
- RCEP and BRICS: Positive, yet not robust.
- G20: Negative; high import demand for digital services offsets benefits.
  Conclusion: Upgrading digital value chains is key to long-term external gains.

Results and discussion (hypothesis 2)

Impact of Digital Trade Enablers on GDP growth

- DDS imports are a strong and positive determinant of GDP growth.
- Strongest in ASEAN, RCEP, and BRICS; technology diffusion effect.
- 2023 dummy: Negative overall; post-pandemic slowdown persists.
- Interpretation: Imports of digital services enhance productivity and innovation (Ing et al., 2023; WTO, 2023).

ASEAN Subsample (DDS Imports on GDP Growth)

- Largest positive effect among blocs; reliance on imported digital services (cloud, fintech, BPO).
- 2023 dummy: Negative but insignificant; resilience maintained.
- Implication: Digital imports bridge domestic capability gaps (ASEAN Secretariat, 2021).
- Takeaway: ASEAN's growth model relies on absorptive capacity from digital imports.

Cross comparison of results and discussion (hypothesis 2)

Bloc	Main effect	Key insight
ASEAN	Strong positive	Digital imports fuel catch-up growth
RCEP	Strongest positive	Integration enhances spillovers
BRICS	Moderately positive	Build innovation through digital imports
CPTPP	Weak	Saturation in advanced markets
G20	Insignificant	Domestic maturity limits new gains

Observation: Emerging economies benefit more from DDS imports.

Results and discussion (hypothesis 2)

- Impact of Digital Trade Enablers on Current Account Balance
  - DDS imports: Weakly positive, marginally significant globally.
  - ASEAN shows the strongest coefficient; improved export competitiveness.
  - RCEP and BRICS: Positive but insignificant; potential not realized.
  - CPTPP and G20: Negative; import reliance pressures external balance.
  - Interpretation: Digital imports initially widen deficits but enhance productivity long-term (Beirne & Fernandez, 2020).

Cross comparison of results and discussion (hypothesis 2)

Bloc	Main effect	Key insight
ASEAN	Positive	Boosts competitiveness through digital inputs
RCEP	Positive	Structural potential emerging
BRICS	Positive	Moderate resilience
CPTPP	Negative	Mixed results due to heterogeneity
G20	Negative	External vulnerability from import saturation

Takeaway: Current account benefits are secondary to growth effects.

Integrative insights (hypothesis 2)

DDS Exports:

- Drive outward competitiveness and GDP growth.

DDS Imports:

- Strengthen absorptive capacity and innovation.

Across All Samples:

- **Emerging Economies:** Stronger growth dividends from CBEC participation.
- **Advanced Economies:** Face saturation and external vulnerabilities.
- **Common Theme:** CBEC participation boosts growth, but current account effects remain modest.

ASEAN

Policy context

- Moving toward the ASEAN Digital Economy Framework Agreement (DEFA); digital integration still fragmented across AMS.

Key findings

- *Skills (ADIIP4)* strongly drive DDS exports.
- *Logistics (ADIIP1)* matter for imports but unevenly developed.
- *Institutional readiness (ADIIP6)* shows diminishing returns.

Interpretation

- Gains from CBEC depend on improving workforce upskilling and harmonizing logistics and payments.

RCEP

Policy context

- Implementation of RCEP's Chapter 12 (E-Commerce) since 2022; formal provisions on electronic signatures, data flows, and customs interoperability.

Key findings

- *Logistics (ADIIP1)* has the strongest and most consistent positive effect on both DDS exports and imports.

Interpretation

- Deep supply-chain integration and strong digital trade provisions amplify cross-border digital flows.

BRICS

Policy Context	• Launch of the BRICS Digital Economy Partnership (2023) focusing on innovation and infrastructure sharing.
Key findings	• Both *skills (ADIIP4)* and *logistics (ADIIP1)* significantly boost DDS exports and imports.
Interpretation	• Dual investment in human capital and logistics infrastructure drives digital export competitiveness.

CPTPP

Policy context	• Advanced framework since 2018 under Chapter 14 (E-Commerce), including data flow liberalization and digital trust standards.
Key findings	• Weaker coefficients; some positive role for *skills*, but not significant.
Interpretation	• Mature markets show diminishing marginal returns; most structural gains have already been realized.

G20

Policy context	• Focus on innovation, AI governance, and cybersecurity under the G20 Digital Economy Ministers' Declaration (2022).
Key findings	• *Skills (ADIIP4)* dominate; *broadband access (ADIIP6)* no longer significant.
Interpretation	• Growth depends less on connectivity and more on innovation and governance.

Conclusions: Key empirical insights

- CBEC participation (DDS exports and DDS imports) is positively influenced by targeted digital enablers.
- Digital Skills (ADIIP4) and Trade and Logistics (ADIIP1) are the binding constraints.
- CBEC participation stimulates GDP growth, with limited current account impacts.
- Emerging economies gain more from digital trade integration; advanced economies face saturation.
- Infrastructure must be complemented by institutional readiness and innovation ecosystems.
- Timing and institutional maturity determine the macroeconomic dividends of digital trade.
    - Emerging blocs gain most from logistics and skills
    - Advanced economies move toward innovation-led digital resilience.

Broader implications

1

ASEAN's growth is increasingly digitally driven, but the benefits are uneven.

2

Need to transition from access-based to ecosystem-based digital development.

3

The ADII component approach provides sharper insight for policy targeting. Conclusion: CBEC is both a growth engine and a test of policy coherence in ASEAN.

Policy Recommendations

Policy Focus 1:

Digital skills upgrading

Upskill human capital

Competitive workforce

Policy Focus 2:

Trade logistics and facilitation

Enhance trade facilitation

Efficient cross-border flows

Policy Focus 3:

Ecosystem strengthening

Strengthen ecosystem governance →
Sustainable digital inclusion

Outcome:

CBEC as a dual engine for growth and resilience.

Areas for future research

Use of the various component variables that were used to construct the ADII pillars

EXPANDING THE ANALYTICAL LENS

DEEPENING THE INDICATORS

STRENGTHENING DATA AND METHODOLOGY

THANK YOU

SALAMAT	**TERIMA KASIH**	ขอขอบคุณ
谢谢	고맙습니다	ありがとう
Ngā mihi nui	**Спасибо**	धन्यवाद
شكرا	**Merci**	**¡Gracias!**