ATTN 2025

CONNECTED FOR GROWTH

Analyzing the Impact of New E-Commerce Adoption on Firm Performance and Labor Outcomes in the Philippines Through Peer Effects

Ma. Kristina P. Ortiz
Congressional Policy and Budget Research Department
House of Representatives
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OUTLINE

- BACKGROUND
- EMPIRICAL STRATEGY
- RESULTS
- POLICY IMPLICATIONS
- CONCLUSION

BACKGROUND

The **digital transformation** of economies has become a key driver of **productivity**, **resilience**, and **inclusive growth**. E-commerce, in particular, enables firms, regardless of size, to access broader markets, improve operational efficiency, and remain agile in times of disruption, such as during the COVID-19 pandemic.

WHAT IS E-COMMERCE?

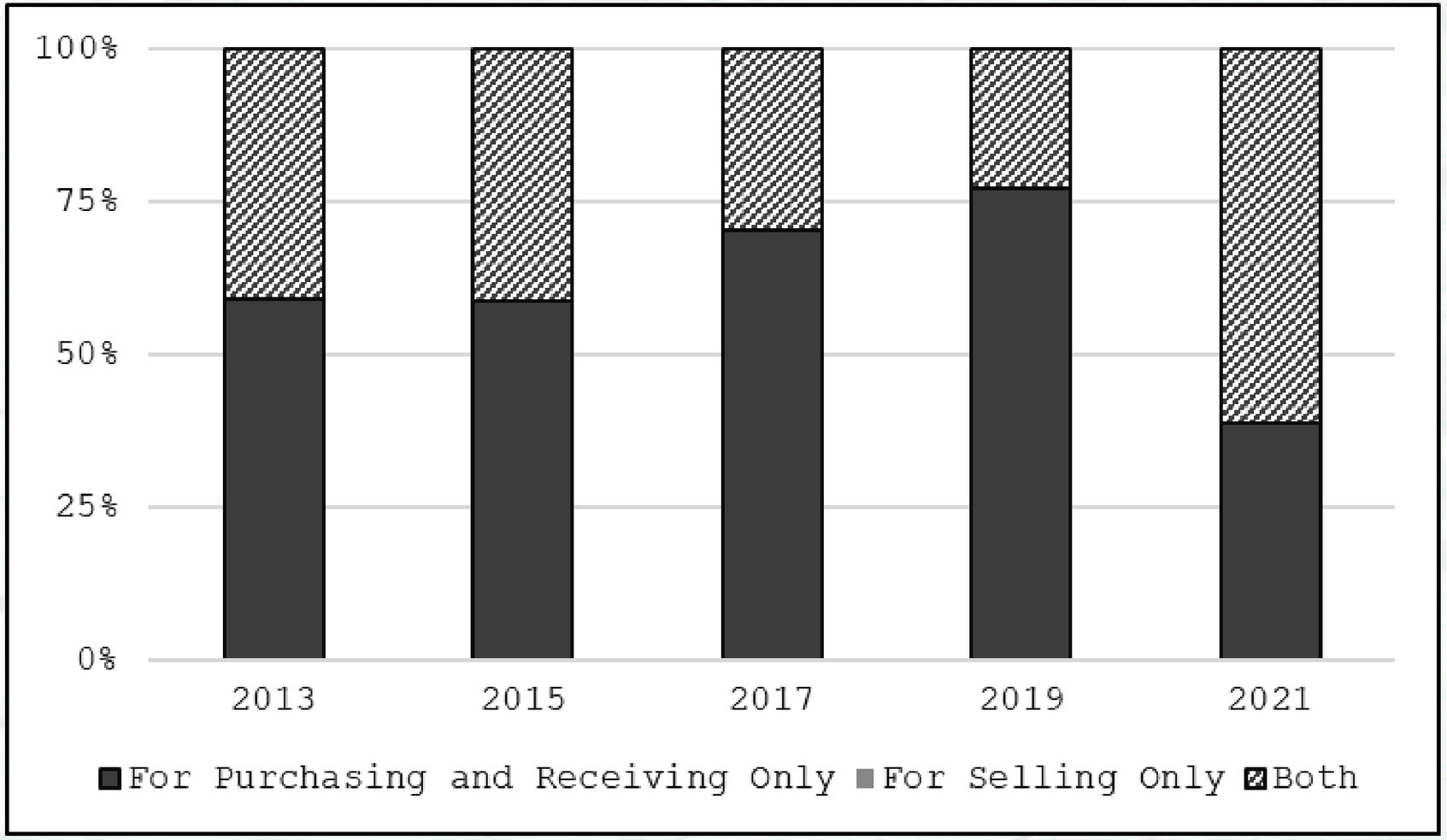
Different **countries apply slightly different definitions** on whether the sale or purchase is conducted over all computer networks or only via the internet, and whether they include orders manually typed through email (UN, 2023)

E-COMMERCE IN THE PHILIPPINES

- **No universally agreed definition**, but supported by key legislations
  - Electronic Commerce Act of 2000 (Republic Act No. 8792)
  - Internet Transactions Act of 2023 (RA No. 11967)
- Definitions of E-Commerce:
  - Under **RA No. 11967**: **sale or lease** of digital or non-digital goods and services over the **internet**; excludes online media content and consumer-to-consumer (C2C) transactions from its scope.
  - Under the **Philippine Statistics Authority**: includes both **purchase and sale** of goods and services over **electronic/digital means** (similar with OECD, 2011 definition)
- The Department of Trade and Industry, through its **E-Commerce Bureau**, serves as the lead regulatory authority for e-commerce transactions
  - **Philippine E-Commerce Roadmap 2016-2020**; **2022** (more recent)

ADOPTION

by purpose, 2013-2021

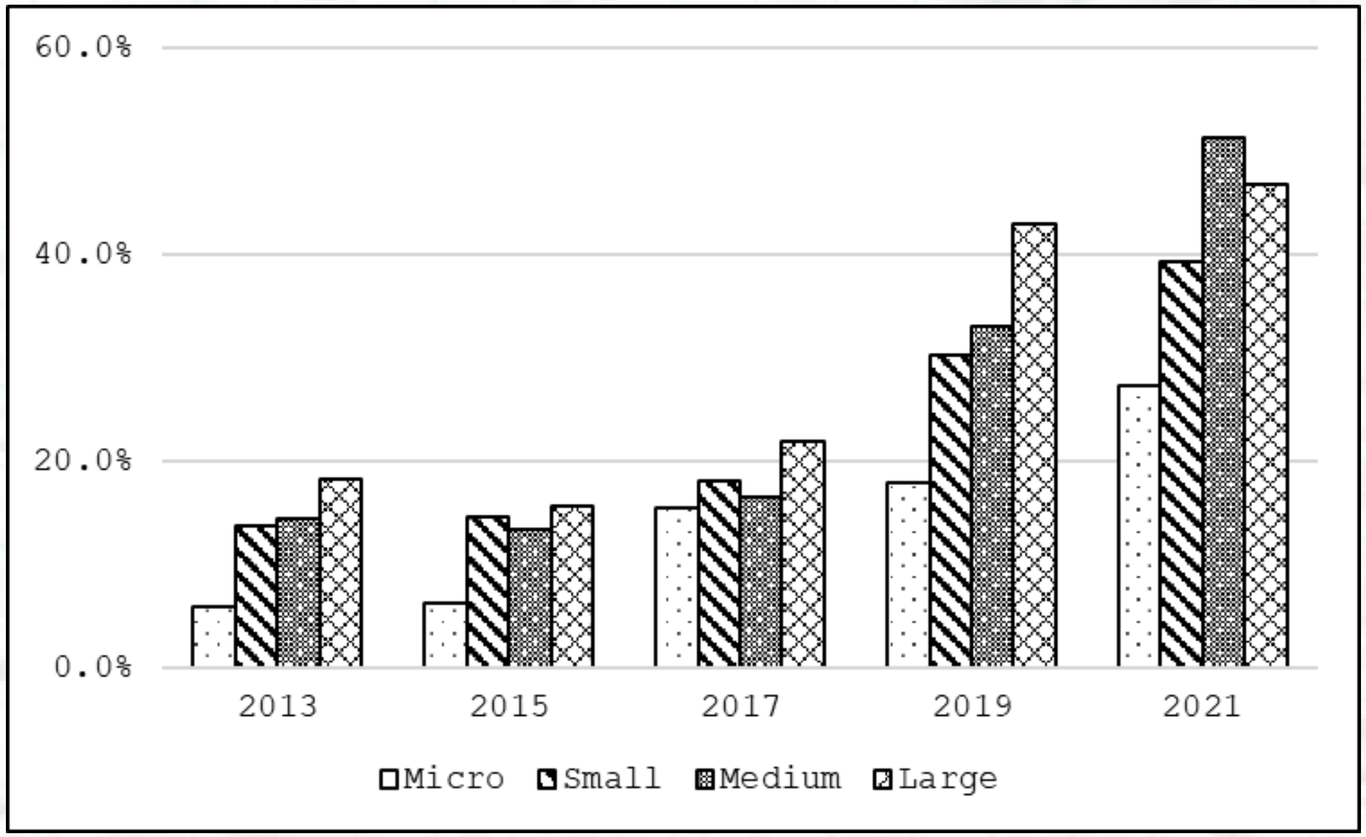


usage has historically leaned toward its use in purchasing and receiving goods and/or services rather than in selling

Note: "For selling" category may not visible due to negligible value in 2015 and no observations in other years

Source: Philippine Statistics Authority; Authors' computations

ADOPTION
by firm size



Source: Philippine Statistics Authority; Authors' computations

Micro firms consistently had the lowest e-commerce adoption rates, although rising from 5.9% in 2013 to 27.4% in 2021

By 2021, medium-sized firms overtook large firms with an adoption rate of 51.4%, compared to 46.9%

WHY DO FIRMS ADOPT E-COMMERCE?

Technological

web functionalities, effective IT integration, and perceived benefits

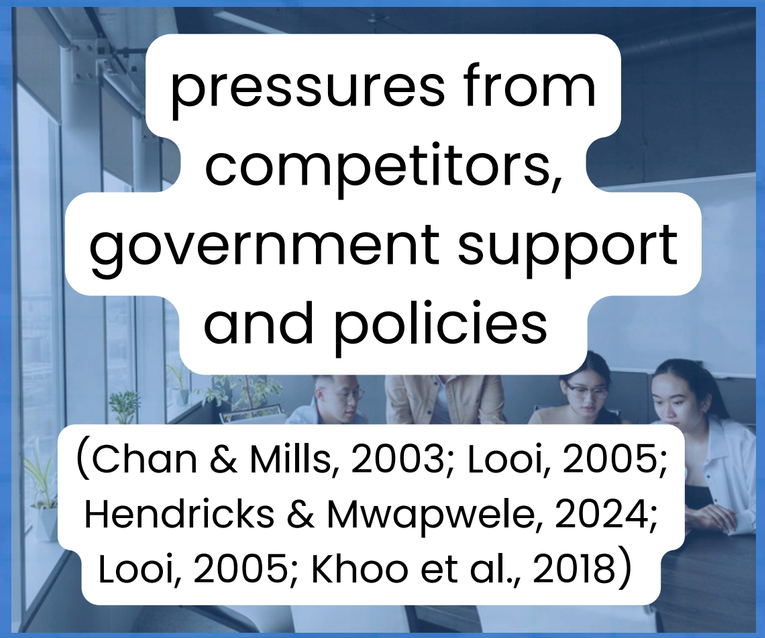
(Hong & Zhu, 2006; Khoo et al., 2018)

Organizational

management support, IT sophistication, and readiness

(Chan & Mills, 2003; Khoo, Ahmi, & Saad, 2018)

Environmental



pressures from competitors, government support and policies

(Chan & Mills, 2003; Looi, 2005; Hendricks & Mwapwele, 2024; Looi, 2005; Khoo et al., 2018)

PEER INFLUENCE ON E-COMMERCE ADOPTION

Clusters, the proximity of firms, suppliers, and customers strengthen competition and accelerates technology uptake

(Beaman et al., 2021; Bekes & Harasztosi, 2020; Conley & Udry, 2010; Hendricks & Mwapwele, 2024; No, 2008; Porter, 1998; Soares-Aguiar & Palma-dos-Reis, 2008)

Over half of adopters in the PH said the adoption of e-commerce helps keeps pace with competitiors

(Quimba & Calizo, 2019)

But effects can be mixed - intense adoption may discourage new adopters or shift focus away from innovation

(Rodríguez-Ardura & Meseguer-Artola, 2010; Wymer & Regan, 2005)

FIRM PERFORMANCE AND LABOR OUTCOMES

the international literature suggests that while e-commerce adoption can yield productivity and revenue gains, the effects **vary across contexts and firm types**

Firm Performance

(+) Cariolle et al (2019), Cusolito et al (2020), Nelson & Richmond (2007), DeFranco et al (2015), Kinda (2019)

(○) Lorca et al (2019), Wheaton & Tung (2019), Mosiashvili & Pareliussen (2020)

Labor Outcomes

(+) Gherghina et al (2021), Sovbetov (2018), Ahmad et al (2024), Jain (2021), Trujillo & Alean-Romero (2024), Sicat et al (2020), Bloom, Schankerman, & Van Reenen (2013), Mosiashvili & Pareliussen (2020)

CASE OF THE PHILIPPINES

Relevant Literature

- De Vera (2004): Employment impact of Business-to-Consumer E-Commerce in the Philippines using Input-Output analysis
  - Projected to account for 1% of GDP by 2005 (PhP1.58B or ~USD29.2M)
  - 11 industries to generate more than 300 thousand jobs in five years

Top 3 Industries Projected to Benefit most from EC Adoption	Projected ↑ Employment	Projected ↑ Revenues
Tour and travel agencies	19,778 (↑188%)	PhP0.01 B (↑261%)
Electrical communication	165,863 (↑78%)	PhP1.00 B (↑396%)
Forwarding, packing, and crating	13,193 (↑78%)	-
Telephone services	-	PhP0.25 B (↑251%)

SIGNIFICANCE & OBJECTIVE OF THE STUDY

- **EC adoption has risen in recent years**, especially during the pandemic, which served as a major catalyst for digital transformation and accelerated the firms' adoption of e-commerce.
- Yet, **limited evidence exists** on how this shift has influenced firms' financial performance, employment, and resilience.
- This study aims to **examine the causal effects of e-commerce adoption in the Philippines on the firms' financial performance and labor outcomes**, shedding light on the possible trade-offs between digital expansion and firm performance.

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DATA SOURCE

Philippine Statistics Authority

- Biennial Survey on Information and Communication Technology from 2013-2021 (2013, 2015, 2017, 2019, 2021)
- merged with the Annual Survey of Philippine Business and Industry (ASPBI)

E-commerce adopter if yes to either:

- “Did this establishment **make purchases** for goods and/or services via internet, excluding social media in [reference year]?”
- “Did this establishment **receive orders** for goods and/or services via internet in [reference year]?”
- “What percent of total **revenue was generated** from e-commerce via internet, excluding social media in [reference year]?”

Variable	Description
TotRev	Total revenue, in PHP, in the outcome year, in natural log
TotExp	Total expenditure, in PHP, in the outcome year, in natural log
Profit	Difference between revenue and expenditure, in PHP, in the outcome year, in natural log
RevPEmp	Revenue per employed person, which serves as a proxy indicator for labor productivity
TotEmp	Total number of employed persons, including both the paid and unpaid, in natural log
FemEmp	Total number of employed women, including both the paid and unpaid, in natural log
EC Adopt	E-commerce adoption, equal to 1 if the firm transitioned from non-adopter to adopter during the treatment period (i.e., answered “Yes” to any questions reflecting e-commerce activity); 0 if the firm maintained its status
Exposed	Peer adoption shock, which equals 1 if the firm’s neighboring group’s e-commerce adoption growth rate during the defined treatment window exceeds a specified cut-off (e.g., average growth); 0 otherwise.
Age	Difference between the survey year and the year the firm started its operations, in natural log
Baseline TotRev	Total revenue, in PHP, in the baseline year, in natural log
Size	Firm size refer to the PSA’s classification of micro, small and medium enterprises; for this study, micro and small are lumped together in one group, followed by medium, and large sized firm.
EC Capability	E-commerce capability of the firm, which equals 1 if the firm use ICT in any of the following activities: finance and accounting, human resources, logistics, and research and development, following Quimba and Calizo’s (2019) work

INSTRUMENTAL VARIABLE REGRESSION

2SLS method with Inverse Probability Weighting

- A type of quasi-experiment / natural experiment
- Estimate the **local average treatment effects of e-commerce adoption** for firms whose adoption decision is **influenced by their exposure** to a certain threshold of **e-commerce adoption among neighboring firms**

1

Balancing the distributions of the base year covariates

Propensity Scores & Inverse Probability Weighting

2

First Stage and Reduced Form

3

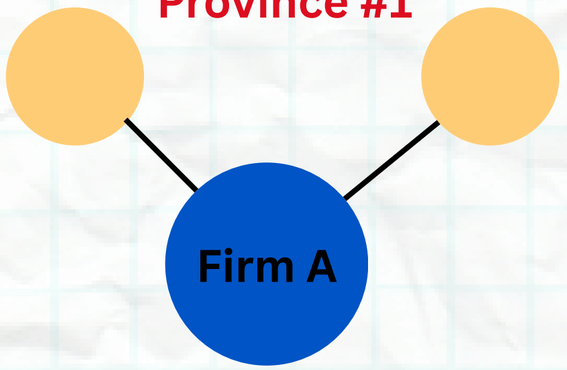
Outcome analysis: IV regression

Two-Stage Least Squares (2SLS) IV Regression

INSTRUMENT, Z: EXPOSURE TO NEIGHBORING FIRMS

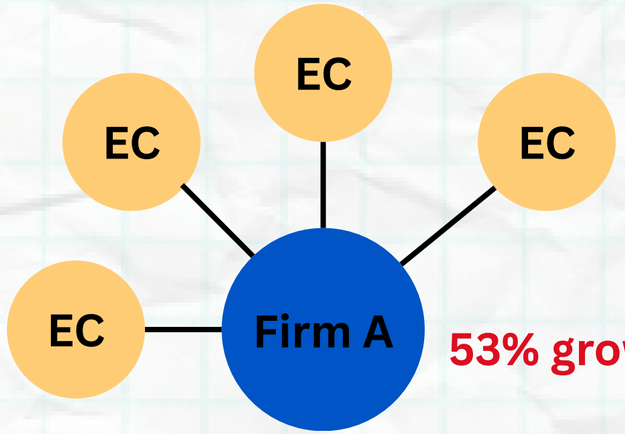
1 Identify neighboring firms

Manufacturing, Province #1



Same major industry + same province

2 Compute neighbors' e-commerce growth within certain period



53% growth

Mean Growth Threshold (Cut-off):
a) unweighted (w/o survey weights)
b) weighted (with survey weights)

**Other iterations: winsorized means

3 Define "exposure" (binary instrument)

Neighbor's growth ≥ Mean Growth Threshold

Z = 1 (Exposed)
Z = 0 (Not exposed)

TREATMENT TIMING WINDOW

Scenario	Baseline Year	Treatment / Exposure Period	Outcome Year
1: Pre-pandemic	2015	2017-2019	2019
2: Pandemic	2015	2017-2021	2021
3: Extended Period	2013	2015-2021	2021

INVERSE PROBABILITY WEIGHTING (IPW)

Balancing Pre-treatment Covariates

- Inverse probability weights (IPW) for the LATE are used to **facilitate the causal effects** in the IV regression model.
- IPW helps balance the distributions of the covariates between the treatment groups by calibrating the weights of the observations, i.e. firms, using the **propensity scores**.
- Propensity scores are derived through **logistic regression of the Z on the set of pretreatment covariates**.
- Having a balanced set of covariates **mimics a random assignment** of the observations in the treatment and control groups.

IV REGRESSION
2SLS METHOD W/ IPW
RELEVANCE CONDITION

1 **FIRST STAGE:**

Baseline covariates

Region FE

$$X_{i,(t_1 \to t_2)} = \alpha_1 + \phi Z_{i,(t_1 \to t_2)} + \gamma_1 W_{i,t_0} + \theta_{1r} + \epsilon_{1i} \quad (01)$$

=1 if firm newly adopted e-commerce
=0 otherwise

=1 if firm's neighboring group (same 1-digit PSIC and province) experienced at least a certain growth level in adoption
=0 otherwise

IV REGRESSION
2SLS METHOD W/ IPW
FULL IV MODEL

2 **SECOND STAGE:**

Baseline covariates

2nd stage Region FE

$$Y_{i,t_2} = \alpha_2 + \lambda_{2SLS}\hat{X}_{i,(t_1 \to t_2)} + \boldsymbol{\gamma_2 W}_{i,t_0} + \theta_{2r} + \epsilon_{2i} \qquad (02)$$

Outcome variable

Predicted treatment from the 1st stage

DATA LIMITATIONS

Results are internally valid for matched firms but are not directly generalizable

1. Period data collection (Annual ASPBI, Biennial SICT)
2. Sectoral coverage (greater representation of core ICT in SICT)
3. Cross-sectional nature

MATCHED OBSERVATIONS

Sector	S1		S2		S3	
	Obs.	Share	Obs.	Share	Obs.	Share
Information and Communication	376	51.9	150	44.3	134	50
Manufacturing	134	18.5	80	23.6	51	19
Administrative and Support	110	15.2	84	24.8	55	20.5
Other Service Activities	34	4.7	5	1.5	12	4.5
Other Sectors	70	9.7	20	5.9	16	6
Total	**724**	**100**	**339**	**100**	**268**	**100**

Source: Philippine Statistics Authority; Authors' computations

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SUMMARY OF FIRST STAGE RESULTS

S1: Pre-Pandemic (Exposure: 2017-2019)

Firms exposed to high neighbor e-commerce growth (Z=1) are **11.9 – 20.1 percentage points (pp)** more likely to adopt e-commerce (X=1) than firms not exposed (Z=0), holding other factors constant.

S2: Pandemic (Exposure: 2017-2021)

Firms exposed to high neighbor e-commerce growth (Z=1) are **22.3 – 23.8 pp** more likely to adopt e-commerce (X=1) than firms not exposed (Z=0), holding other factors constant. [**Stronger peer effect than in S1**]

S3: Extended Period (Exposure: 2015-2021)

Firms exposed to high neighbor e-commerce growth (Z=1) are **16.7 – 45.6 pp** more likely to adopt e-commerce (X=1) than firms not exposed (Z=0), holding other factors constant. [**Strongest peer effect among the three scenarios**]

CAUSAL EFFECTS

pre-pandemic (S1)

Early adoption benefits are in jobs and employment

Strong positive effects on employment
(+139% to +356%)

Female employment also higher for e-commerce adopters (marginally significant)

No significant effects on revenues, expenses, or profits

CAUSAL EFFECTS

pandemic (S2)

pandemic-period adoption broadened impacts to revenue and expense growth

Adoption increases revenues (+147%) and expenses (+101.6%)

Offsetting effects leave profits with no significant effect - scaling up phase

CAUSAL EFFECTS

pandemic (S3)

Benefits are time-sensitive and context-dependent

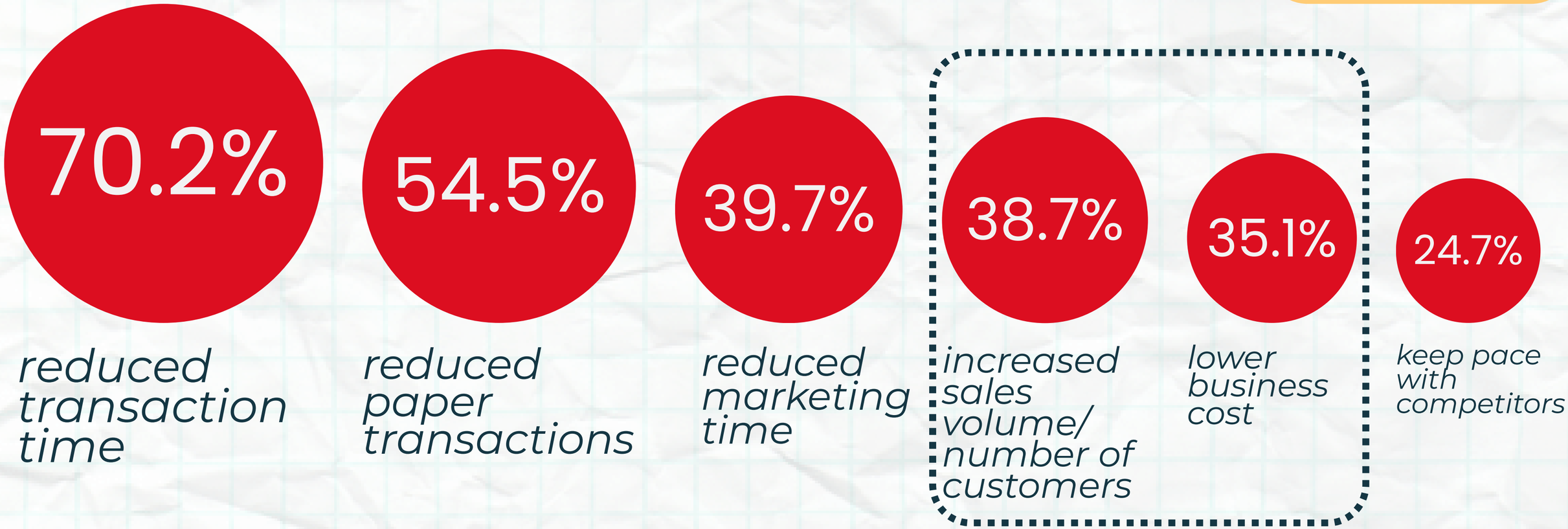
Strong positive effects on revenues (+231.3%) and expenses (+260.0%), but profitability declines (–76.4% to –88.1%), suggesting rising adjustment costs

Likely due to pandemic-related disruptions, forced/unprepared digital transitions, and higher operational expenses

ADOPTION

perceived benefits in 2021 by adopters

Putting things into perspective...



ADOPTION

perceived limitations in 2021 by non-adopters

Putting things into perspective...

59.8%

prefer to maintain current business model

44.4%

security and privacy concerns

18.7%

unreliable internet connections

15.1%

lack of skilled employees

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POLICY IMPLICATIONS

Accelerating progress in the implementation of the PH E-Commerce Roadmap, supporting the implementation of the Magna Carta for Women (RA 9710), enhancing peer diffusion mechanisms and digital ecosystems, boosting digital skills and infrastructure, promoting consumer protection and trust in digital markets, and harmonizing data

22 FOR 2022

Philippine E-Commerce Roadmap

1. Accelerate the implementation of the National Broadband Plan
2. Increase secure internet servers
3. Develop an e-Commerce logistics infrastructure and investment convergence program
4. Modernize and transform the Philippine Postal Corporation into a competent partner and major player in the logistics sector
5. Promote streamlining and automation in government and a pleasant user experience on online public services
6. Fast-track the implementation of the Philippine Identification System
7. Update Customs policies and procedures to cover and facilitate ecommerce transactions
8. Push for the adoption of the proposed Internet Transactions Act
9. Identify and address regulatory bottlenecks that impede e-Commerce growth
10. Create an enabling environment for the Gig Economy
11. Implement the Digital Payment Transformation Roadmap 2022-2023 of the BSP
12. Implement TRAIN 1 provisions on e-invoicing
13. Automate systems to make the resolution of consumer complaints more efficient and develop online dispute resolution system
14. Implement a cohesive full-scale MSME digitalization program among government agencies nationwide
15. Spur investments in Innovation by providing support to Filipino enterprises creating digital goods and services. "Tayaan ang Pilipino!"
16. Promote the exchange of goods and services between companies either through a direct or marketplace model and increase adoption of cashless transactions
17. Enhance cross border cooperation and market access through trading agreements and economic cooperation programs with major e-Commerce trading partners
18. Develop a cadre of digital skill workers to support the growing e-Commerce sector
19. Develop and implement the "Basta E-commerce, MADALI!" Communication Plan
20. Create the e-Commerce Bureau and support with resources and capacity building
21. Create the e-Commerce Promotion Council comprised of stakeholders from both the public and private sector
22. Modernize and remodel the system of generating e-Commerce-related statistics and studies to be responsive to the needs of the stakeholders

a ***comprehensive review of the progress*** in these outcomes are important to ensure the attainment of its measures of success

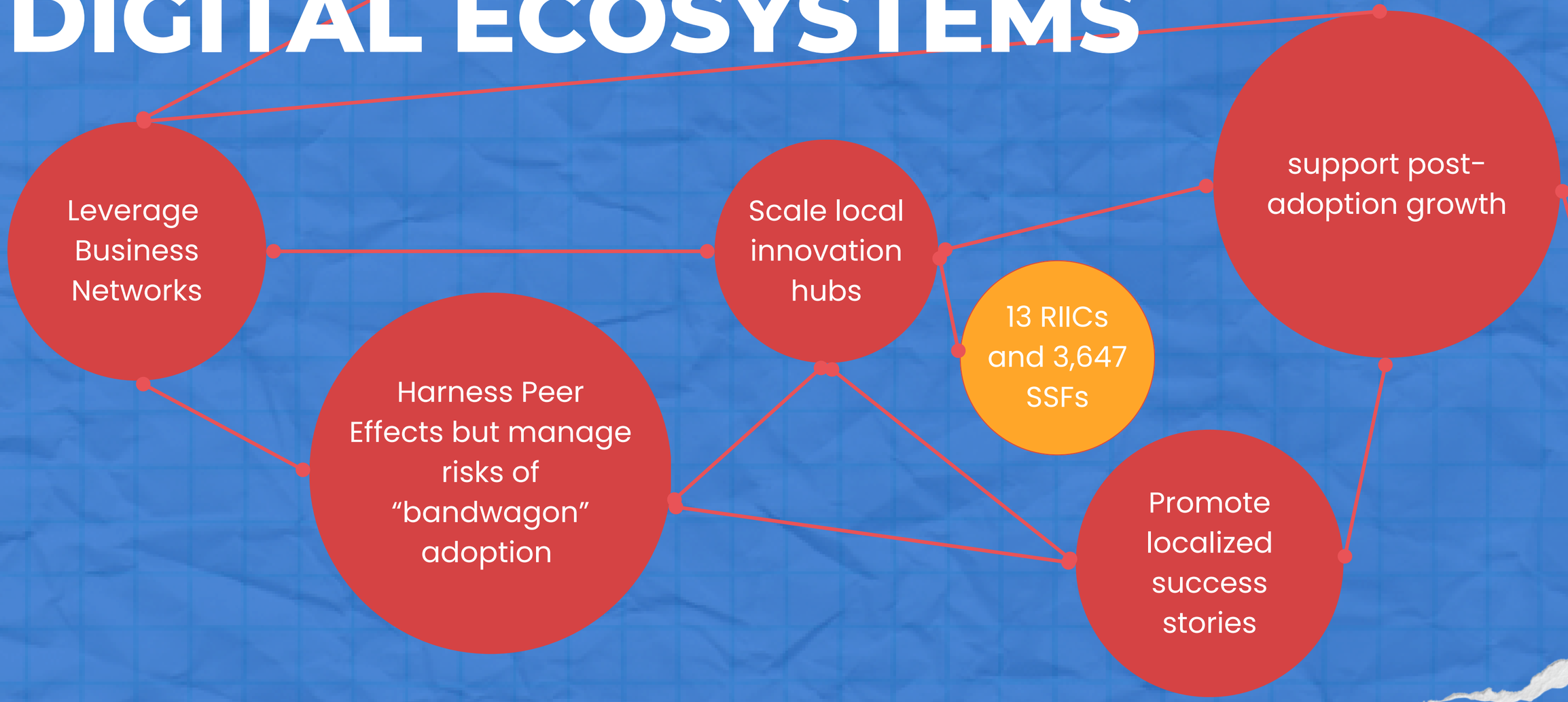
MAGNA CARTA FOR WOMEN

RA 9710

GAD programs addressing gender issues and concerns shall be designed and implemented based on the mandate of government agencies and local government units, Republic Act No. 7192, gender equality agenda of the government and other GAD-related legislation, policies, and commitments.

The cost of implementing GAD programs shall be the agency's or the local government unit's GAD budget which shall be at least five percent (5%) of the agency's or the local government unit's total budget appropriations.

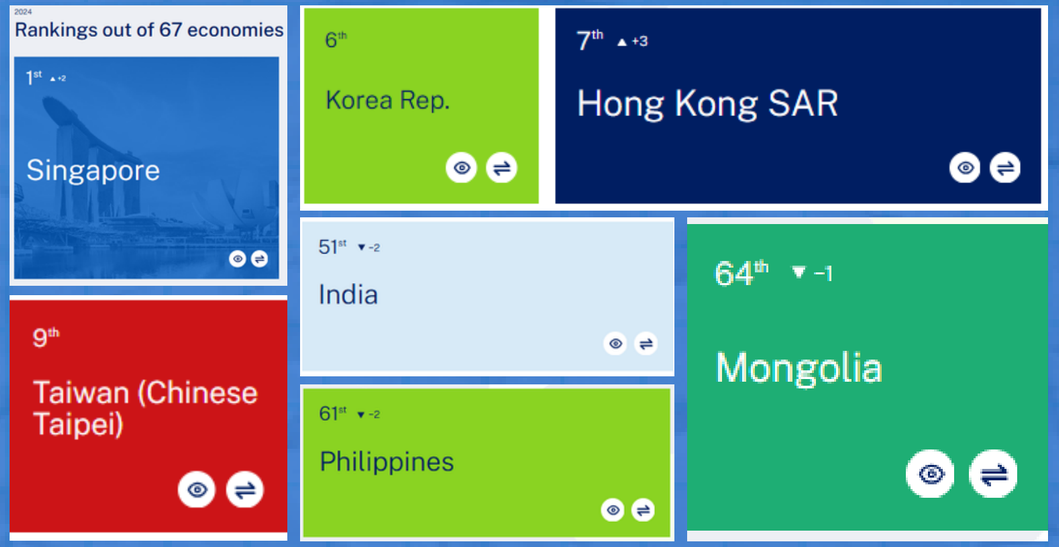
PEER DIFFUSION MECHANISM AND DIGITAL ECOSYSTEMS



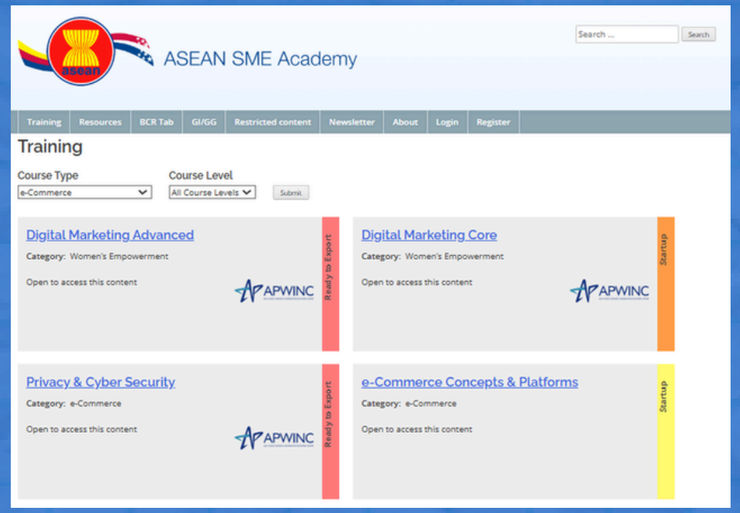
DIGITAL SKILLS AND INFRASTRUCTURE

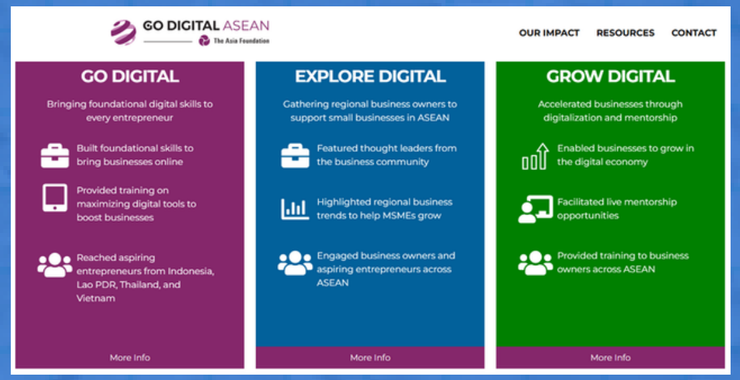
Robust digital and logistics infrastructure, alongside digital skills upgrading, is essential in e-commerce development

(ADB, 2018; 2023)



The digital divide persists across and within Asia, reflecting weaknesses in terms of knowledge, technology, and future readiness





Support domestic firms' participation in regional, inclusive digital capacity building, especially for lagging countries to learn best practices

CONSUMER PROTECTION AND TRUST

Malaysia Trustmark®

E-COMMERCE PHILIPPINE TRUSTMARK

Trustmark schemes
to boost consumer confidence and signal compliance with fair e-commerce practices

ASEAN Guidelines on Online Dispute Resolution (ODR)

Strengthen redress mechanisms for e-commerce transactions

HARMONIZE AND IMPROVE DATA

Regional alignment on concepts and indicators can enable more consistent measurement, support evidence-based policies, and promote cross-country comparability

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CONCLUSION

Novel empirical evidence

Causal study on the effects of e-commerce adoption in Philippine firms using matched firm-level data

TIME-SENSITIVE IMPACTS

Early phase (S1)

Job creation, especially for women

Mid phase (S2)

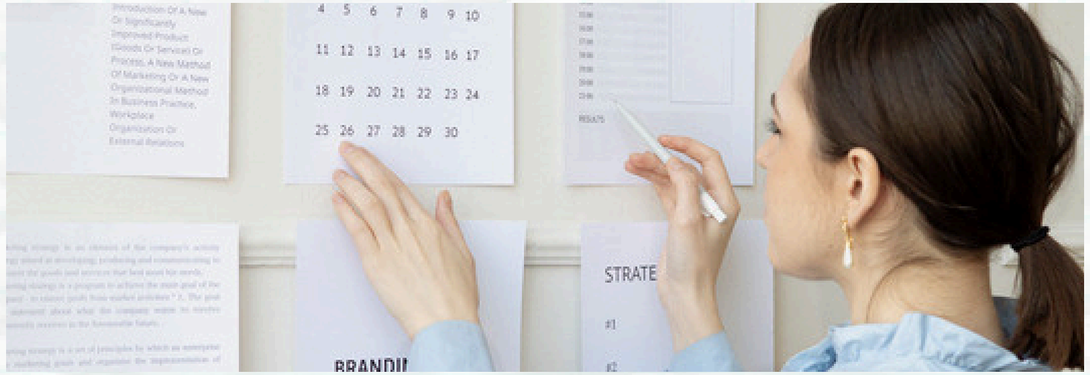
Revenue and expense expansion

Scaling up

Full horizon (S3)

Adjustment costs

Pressure on profitability



POLICY PATH FORWARD

Enhance diffusion networks

Leverage RIICs, SSFs, and local business groups to spread adoption.

Move beyond access

Help firms use and integrate digital tools effectively

Invest in inclusion

Focus on digital infrastructure and skills in lagging sectors and regions

Promote regional learning

Use ASEAN platforms for knowledge-sharing and harmonized digital metrics

Strengthen trust and data

Consumer protection, trustmarks, and improved data collection

M.K.P. Ortiz

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THANK YOU.

Photo sources

Slide 42: PHDTI (https://ecommerce.dti.gov.ph/madali/)

Slide 44: IMD (https://www.imd.org/centers/wcc/world-competitiveness-center/rankings/world-competitiveness-ranking/), ASEAN (https://asean-sme-academy.org/the-asean-sme-academy/), GoDigital ASEAN (https://godigitalasean.org/)

Slide 45: MYS Marine Department (https://marine45.marine.gov.my/public/ENPage1.aspx) and PH DTI (https://trustmark.dti.gov.ph/)

Slides 3, 4, 32, 34, 37, 41, 45, 47, 48, 50: Canva