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Digital Readiness and the Evolving E-Commerce Divide in ASEAN: A Composite Index Analysis, 2013–2023

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ABSTRACT

This study examined digital and e-commerce readiness across all ten ASEAN member states from 2013 to 2023, using a composite Digital Readiness Index (DRI) constructed from three World Bank World Development Indicators: Internet Use, Mobile Cellular Subscriptions, and Fixed Broadband Subscriptions, each rescaled to a common 0-100 range and averaged. The region-wide average DRI rose from 37.7 in 2013 to 63.5 in 2023, with every country recording a gain; Myanmar posted the largest increase (+44.0), consistent with documented technological leapfrogging, while Singapore, already near the ceiling of the index, recorded the smallest (+7.5). The coefficient of variation of DRI across the ten countries nearly halved over the period (.609 to .296), indicating substantial sigma convergence; however, decomposing this result by component showed that while Internet Use and Mobile Subscriptions converged sharply, Fixed Broadband remained three to four times more unequally distributed than the other two indicators throughout, indicating an uneven rather than uniform narrowing of the regional digital divide. Pooling all available country-year observations (N = 110), DRI was strongly and significantly correlated with both GDP per capita, $r(108) = .69$, $p < .001$, and urban population share, $r(108) = .77$, $p < .001$. These findings suggest that ASEAN's digital transformation has been broad-based but structurally uneven, with practical implications for how marketers sequence digital and e-commerce market entry across the region. The study is correlational and based on publicly available macro-level indicators; e-commerce-specific outcomes were not directly measured. Recommendations for practice and future research, including a weighted or purpose-specific readiness index and a formal panel-econometric extension, are discussed.

Keywords: *digital readiness; digital divide convergence; ASEAN; e-commerce readiness; digital marketing; GDP per capita; urbanization*

1. Introduction

1.1 Background of the Study

The rapid diffusion of internet access, mobile telephony, and broadband connectivity has reshaped how consumers discover, evaluate, and purchase products, making digital readiness an increasingly central consideration in international marketing and market-entry decisions. The Association of Southeast Asian Nations (ASEAN) is frequently described as one of the world's fastest-growing digital consumer regions, yet its member states differ substantially in income, infrastructure, and telecommunications history, producing wide variation in how digital marketing channels and e-commerce can be practically deployed from one market to the next. In the Philippines, for example, even long-established retailers now operate amid accelerating e-commerce penetration and platform-based price competition (A. G. Atento & R. G. Atento, 2026b).

For marketers evaluating ASEAN as a set of potential digital markets, three questions recur: how digitally ready is each market today, how has that readiness changed over time, and whether readiness is converging across the region or remaining persistently unequal. A market that appears unattractive today may be one of the fastest-growing digitally, while a market that leads today may already be near saturation with limited room for further gains – both are

materially different signals for a digital marketing or e-commerce strategy, and neither is visible from a single-year snapshot alone.

This study addresses these questions by constructing a composite Digital Readiness Index (DRI) for all ten ASEAN member states from 2013 to 2023, based on three publicly available World Bank World Development Indicators (WDI) series: Individuals Using the Internet, Mobile Cellular Subscriptions, and Fixed Broadband Subscriptions. It further considers whether this readiness is associated with two commonly cited structural factors – a country's level of economic development (GDP per capita) and its degree of urbanization – to inform how marketers might interpret and anticipate digital readiness beyond the indicators themselves.

1.2 Statement of the Problem

This study sought to compare digital and e-commerce readiness across the ten ASEAN member states from 2013 to 2023. Specifically, it sought to answer the following research questions:

1. What is the trend in digital readiness, as measured by the Digital Readiness Index, among ASEAN countries from 2013 to 2023?
2. Which ASEAN countries experienced the greatest gains in digital readiness over this period, and which remained comparatively stable?
3. Has the digital divide among ASEAN countries – the gap between the highest- and lowest-scoring countries – narrowed or widened over the study period?
4. Is there a significant relationship between a country's level of economic development (GDP per capita) and its Digital Readiness Index score?
5. Is there a significant relationship between a country's degree of urbanization and its Digital Readiness Index score?

Correspondingly, the following null hypotheses were tested at the .05 level of significance for the two relational research questions:

$H0_1$: There is no significant relationship between GDP per capita and Digital Readiness Index scores among ASEAN countries.

$H0_2$: There is no significant relationship between urban population share and Digital Readiness Index scores among ASEAN countries.

1.3 Significance of the Study

The results of this study may benefit the following groups. Marketing and brand managers evaluating ASEAN for digital campaigns or e-commerce expansion may use the Digital Readiness Index and its ten-year trend to identify markets that are digitally mature versus markets that are rapidly emerging, informing sequencing and resource allocation decisions. Digital marketing educators and students may use the dataset and index as a worked, replicable example of how publicly available macro-level indicators can be converted into a decision-relevant comparative tool. Telecommunications policymakers and regulators may find the country-level trend and convergence analysis useful as an external benchmark of relative digital infrastructure progress. Finally, the academic community may benefit from a transparently sourced, decade-long, ten-country dataset that can be extended or re-specified in future research on digital transformation in Southeast Asia.

1.4 Scope and Delimitation

This study is delimited to country-level, publicly available secondary data for all ten ASEAN member states, drawn from the World Bank's World Development Indicators (WDI) database. The analysis covers 2013 to 2023 (11 annual observations per country), selected because all three Digital Readiness Index component indicators have near-complete coverage for every ASEAN country across this window. The Digital Readiness Index is constructed from three indicators only – Internet Use, Mobile Cellular Subscriptions, and Fixed Broadband Subscriptions; it does not include e-commerce-specific measures such as online retail sales, digital payment adoption, or social media usage, as

these are not available in the WDI database at the time of writing and their absence should be treated as a limitation rather than an implied judgment of irrelevance. Urban population is reported alongside the Index for context but is not one of its components. The study's fourth and fifth research questions are correlational, not causal, and are assessed at the country level rather than the level of the individual consumer or firm.

1.5 Definition of Terms

For clarity and consistency, the key variables of this study are operationally defined in Table 1.

Table 1. *Operational Definitions of Study Variables*

Term	Operational Definition
Digital Readiness Index (DRI)	A composite score (0-100) constructed for this study as the average of three min-max rescaled World Bank WDI indicators – Internet Use, Mobile Cellular Subscriptions, and Fixed Broadband Subscriptions – rescaled against the region-wide 2013-2023 minimum and maximum for each indicator. Used as the study's primary comparative measure of digital readiness.
Individuals Using the Internet	The percentage of a country's population that used the Internet in the past three months, from any device (World Bank WDI indicator IT.NET.USER.ZS).
Mobile Cellular Subscriptions	Subscriptions to a public mobile telephone service, per 100 people; may exceed 100 due to multiple-SIM ownership (WDI indicator IT.CEL.SETS.P2).
Fixed Broadband Subscriptions	Fixed subscriptions to high-speed internet access, per 100 people (WDI indicator IT.NET.BBND.P2).
Urban Population	The percentage of a country's total population living in areas classified as urban, included as contextual (logistics/fulfillment) information rather than as a component of the Digital Readiness Index (WDI indicator SP.URB.TOTL.IN.ZS).
GDP per Capita	Gross domestic product divided by midyear population, in current US dollars (WDI indicator NY.GDP.PCAP.CD).
Digital Divide	The gap in access to, and use of, information and communication technologies between countries or population groups.

2. Review of Related Literature

This chapter synthesizes prior empirical research on the factors central to this study – the relationship between digital technology adoption and (a) GDP per capita, (b) urbanization, (c) technological leapfrogging in developing economies, and (d) convergence or divergence in the digital divide – together with the literature linking digital penetration to e-commerce and digital marketing outcomes. The chapter closes with a synthesis that identifies the specific gap this study addresses.

2.1 Economic Development and Digital Technology Adoption

National income, measured as GDP per capita, is one of the most consistently documented predictors of digital technology diffusion. In a cross-national analysis of 191 countries, Mubarak et al. (2020) found income and

educational attainment positively associated with ICT diffusion, identifying income as a leading systemic driver of the global digital divide. Using a 170-country sample, Abdurakhmanova et al. (2021) found that GDP per capita significantly predicted a country's Digital Adoption Index score, together with human capital explaining 84% of the variance in adoption. Longitudinal, fixed-effects evidence similarly shows that higher GDP per capita predicts higher internet usage, broadband deployment, and mobile penetration over time (Rajagukguk, 2022). Importantly for a region spanning both high- and low-income economies, this relationship is not uniform: the marginal effect of GDP per capita on internet penetration is substantially larger in low- and middle-income countries than in wealthy, near-saturated markets (Billon et al., 2021; Ünver, 2017), and in some specialized models GDP per capita loses statistical significance once telecommunications competition and literacy are controlled for (Kraus et al., 2025; Vincent, 2016).

2.2 Urbanization and Digital Technology Adoption

Urbanization is similarly well established as a predictor of digital technology adoption, primarily through its effect on telecommunications infrastructure economics. Dense urban populations lower the per-subscriber cost of deploying mobile and fixed-line networks, giving telecommunications providers a stronger business case for urban rollout (Astuti & Ayinde, 2025). Using household survey data across seven West African countries, Masaki et al. (2021) found that urban residence increased the probability of mobile broadband adoption by 4.5 percentage points, an effect that held after controlling for education, electricity access, and income. In the United Kingdom, large-urban residence was found to significantly predict higher smartphone-based internet access relative to smaller towns and rural areas (Hong & Thakuriah, 2018). At the same time, urbanization does not guarantee equitable digital access within cities: rapid, under-planned urbanization can produce internal 'digital slums,' where poverty and device costs continue to constrain adoption among the urban poor even where network coverage exists (Poloko et al., 2026; Vaithilingam et al., 2022).

2.3 Technological Leapfrogging in Developing Economies

A substantial literature documents technological leapfrogging, in which developing economies bypass costly fixed-line telecommunications infrastructure and move directly to mobile and wireless connectivity. Between 2005 and 2013, mobile subscriptions across developing countries grew from 1.2 billion to over 5.2 billion, while fixed telephony remained largely stagnant (Avgerou et al., 2016). This pattern is explicitly documented in Southeast Asia: Myanmar and Vietnam are cited among the clearest examples of rapid, leapfrogging mobile adoption in the recent literature (Pham, 2025), a pattern consistent with the sharp gains in this study's own Digital Readiness Index for Myanmar between 2013 and 2023. Mobile connectivity, rather than fixed-line infrastructure, has been found to function as the primary catalyst of digital-economy development in these settings, including secondary leapfrogging into mobile financial inclusion (Bala, 2024; Dumo, 2026). This leapfrogging is nonetheless partial: mobile-first access does not automatically resolve the 'second' digital divide in digital literacy and the depth of technology use, with less-educated and older users in Indonesia, for example, adopting basic feature phones without gaining the deeper information-retrieval capabilities associated with smartphone and PC use (Puspitasari & Ishii, 2016; James, 2020). Similarly, evidence from the Global Findex 2025 indicates that expanding mobile and internet connectivity across Asia has not translated uniformly into active financial participation, with connectivity quality, demand-side conditions such as digital literacy and trust, and the regulatory environment jointly shaping how connectivity is converted into use (A. G. Atento et al., 2026).

2.4 Convergence and Divergence of the Digital Divide, with Evidence from ASEAN

Whether the digital divide is narrowing or widening over time depends heavily on which tier of digital capability is examined, and the most directly relevant evidence comes from studies of ASEAN itself. Reviewing convergence research broadly, the literature indicates that basic connectivity access tends to converge across countries while more advanced capabilities – broadband quality, digital skills, and commercial digital usage – continue to diverge or persist (Nagirnaya, 2025; Zhao & Kuang, 2025). This exact pattern has been documented within ASEAN specifically: examining the top five ASEAN economies, Hanif et al. (2025) found convergence in internet use but continued divergence in fixed broadband subscriptions. A related study across Vietnam, the Philippines, Laos, Cambodia, and Indonesia similarly frames the region's digital divide as a live, only partly closing gap rather than a settled convergence story (Rashid et al., 2025). At a broader regional level, Aumeboonsuke (2024) directly compared digital convergence and divergence between the European Union and ASEAN, and a companion study traced the determinants of the

digital gap between Central Europe and Southeast Asia from 2002 to 2024 (Aumeboonsuke & Čaplánová, 2026). These four studies are the closest prior work to the present study and are discussed further in the synthesis below.

2.5 Digital Penetration, E-Commerce Adoption, and Digital Marketing Effectiveness

The practical relevance of digital readiness to marketing rests on a further, well-evidenced link: higher internet and mobile penetration measurably increases both e-commerce adoption and digital marketing effectiveness. Mobile devices now generate over 62% of global internet traffic and 60% of online browsing time, having shifted digital shopping into a primarily mobile behavior (Zhang & Song, 2025). A meta-analysis of 207 studies and nearly 69,000 shoppers found that the ubiquity enabled by mobile access is the strongest predictor of mobile shopping adoption (Luceri et al., 2022), and bibliometric evidence similarly positions digital and mobile access as foundational to how consumers now discover and evaluate products online (Figueiredo et al., 2025). In the Philippines, senior high school learners reported a markedly stronger preference for social media marketing than for tarpaulins or radio advertisements (Espelita et al., 2026), and related work has examined how perceived influencer credibility and parasocial trust relate to purchase intention among young adult social media users (A. G. Atento & R. G. Atento, 2026a). On the marketing-performance side, e-commerce capability has been found to significantly strengthen the positive effect of digital marketing strategy on overall marketing performance (Waseem et al., 2024), and mobile-specific channels such as app push notifications have been linked to conversion rates exceeding those of traditional broadcast promotion (Sharma, 2025). At the macro level, internet access has itself been treated as a form of marketing infrastructure across ASEAN-5 economies, where it was positively associated with equity-market capitalization, although it did not significantly predict household consumption growth (Lantin-Magana & Atento, 2026). Taken together, this literature supports treating digital readiness not merely as an infrastructure statistic but as a leading indicator of a market's practical suitability for digital marketing and e-commerce activity.

2.6 Synthesis and Research Gap

Four conclusions from this literature directly inform the present study. First, GDP per capita is a well-established predictor of digital technology adoption, though its marginal effect is largest precisely where income is lowest – a pattern this study's own data appear to echo in the contrast between Singapore's near-saturated, slow-moving score and Myanmar's rapid gains from a very low base (Billon et al., 2021; Mubarak et al., 2020). Second, urbanization is a plausible but not unconditional predictor of digital readiness, given documented internal disparities within urban populations (Masaki et al., 2021; Poloko et al., 2026). Third, technological leapfrogging is a well-documented phenomenon in Southeast Asia specifically, with Myanmar and Vietnam already named in the literature as examples (Pham, 2025) – directly consistent with this study's own finding that Myanmar posted the largest Digital Readiness Index gain of any ASEAN country over 2013-2023. Fourth, and most important methodologically, the ASEAN convergence literature indicates that basic connectivity and advanced infrastructure can move in opposite directions at the same time (Hanif et al., 2025; Rashid et al., 2025), which means this study's composite Digital Readiness Index – built by averaging internet use, mobile subscriptions, and fixed broadband into a single score – may obscure a genuine tiered divide between rising basic access and a persistently unequal broadband layer. This is flagged here as an interpretive caution for the results chapter rather than resolved in the present chapter. Although Aumeboonsuke (2024) and Aumeboonsuke and Čaplánová (2026) have already examined ASEAN's digital convergence against European comparators, and Hanif et al. (2025) and Rashid et al. (2025) have examined convergence within subsets of ASEAN, no identified study combines all ten ASEAN member states in a single composite readiness index framed explicitly around digital marketing and e-commerce decision-making, or explicitly relates that index to both GDP per capita and urbanization within the same dataset. This study addresses that specific gap.

3. Methodology

3.1 Research Design

This study employed a quantitative, descriptive-comparative research design using secondary, country-level annual panel data. The design combines three analytical components: (a) construction of a composite Digital Readiness Index (DRI) to enable direct comparison of digital readiness across countries and over time; (b) trend and convergence analysis to examine how the ASEAN digital divide evolved from 2013 to 2023; and (c) correlational

analysis to examine whether GDP per capita and urbanization are associated with DRI scores. As with the correlational component of a purely observational design, (c) supports association rather than causal inference.

3.2 Data Source

All data were obtained from the World Bank's World Development Indicators (WDI) database, a publicly available, regularly updated repository of internationally comparable country-level development indicators. Data for all ten ASEAN member states were extracted from the WDI bulk CSV file and compiled into a single annual panel dataset for analysis. No primary data collection, survey administration, or human participant involvement was undertaken.

3.3 Study Period, Countries, and Unit of Analysis

The unit of analysis is the country-year, covering all ten ASEAN member states – Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam – from 2013 to 2023 (11 annual observations per country), for a maximum panel of 110 country-year observations. This window was selected because the three Digital Readiness Index component indicators have near-complete coverage for every ASEAN country across these years. Two cells are missing from the underlying WDI series – Cambodia's Internet Use indicator for 2018, and Myanmar's Fixed Broadband indicator for 2013 and 2014 – and were left blank rather than imputed; DRI values for the affected country-years were computed as the average of the remaining available components.

3.4 Digital Readiness Index Construction

The Digital Readiness Index (DRI) is a composite score constructed for this study from three World Bank WDI indicators: Individuals Using the Internet (% of population), Mobile Cellular Subscriptions (per 100 people), and Fixed Broadband Subscriptions (per 100 people). Each indicator was rescaled to a common 0-100 range using min-max normalization:

$$Scaled(i, c, t) = [\ (X(i,c,t) - Xmin(i)) / (Xmax(i) - Xmin(i))\ ] \times 100$$

where X(i,c,t) is the raw value of indicator i for country c in year t, and Xmin(i) and Xmax(i) are the minimum and maximum values observed for that indicator across all ten countries and all eleven years (2013-2023) combined – a single, fixed reference range rather than a range recalculated separately for each year. The DRI for a given country-year is the unweighted average of the three rescaled indicators. Urban population was deliberately excluded from the Index itself and is reported only as contextual information, consistent with the scope defined in Chapter 1. A fixed, panel-wide minimum and maximum was used specifically so that a rising DRI score reflects genuine growth in digital readiness over time, rather than merely a change in a country's rank relative to its neighbors in a given year; a year-by-year rescaling would have obscured absolute progress by design.

3.5 Variables and Operational Definitions

Table 2 presents the study variables together with their WDI indicator codes, operational definitions, and role in the analysis.

Table 2. *Study Variables, WDI Indicator Codes, and Operational Definitions*

Variable	WDI Code	Operational Definition	Role
Digital Readiness Index (DRI)	— (derived)	Unweighted average of the three rescaled (0-100) component indicators below. This study's dependent/comparative measure.	Composite
Individuals Using the Internet	IT.NET.USER.ZS	% of population that used the Internet in the past three months.	DRI component
Mobile Cellular Subscriptions	IT.CEL.SETS.P2	Subscriptions to a public mobile telephone service, per 100 people.	DRI component

Fixed Broadband Subscriptions	IT.NET.BBND.P2	Fixed subscriptions to high-speed internet access, per 100 people.	DRI component
Urban Population	SP.URB.TOTL.IN.ZS	% of total population living in urban areas.	Independent ($RQ5/H0_2$)
GDP per Capita	NY.GDP.PCAP.CD	Gross domestic product divided by midyear population, current US$.	Independent ($RQ4/H0_1$)

3.6 Data Analysis

Descriptive statistics and the DRI trend from 2013 to 2023 were computed for each country to address the first and second research questions. To address the third research question, the degree of convergence or divergence in DRI scores across ASEAN was assessed using the coefficient of variation (CV) – the cross-country standard deviation of DRI divided by the cross-country mean DRI – calculated separately for each year from 2013 to 2023; a declining CV over time indicates convergence (countries becoming more similar), while a rising CV indicates divergence. This sigma-convergence approach follows established practice in the digital-divide literature (e.g., Andrei et al., 2022; Hanif et al., 2025; Kuzior et al., 2022). The same dispersion-based sigma-convergence lens has also been applied to PPP-adjusted GDP per capita across the ten ASEAN member states and selected Asian comparators using WDI data (Balingit et al., 2026). To address the fourth and fifth research questions, Pearson product-moment correlation coefficients were computed between DRI and (a) GDP per capita and (b) urban population share, pooling all available country-year observations (up to $N = 110$), using a two-tailed test of significance at $\alpha = .05$. Because pooled observations drawn from the same country across multiple years are not fully independent of one another, this correlation is reported as a descriptive, pooled association rather than a formal panel-econometric estimate; this distinction is treated as a limitation in Section 3.8 rather than a definitive treatment of the relationship.

3.7 Ethical Considerations

This study relied exclusively on publicly available, aggregate, country-level secondary data published by the World Bank. No human respondents, primary surveys, or personally identifiable information were involved, and no informed consent or institutional ethics review was therefore required. The data source is properly attributed throughout this paper, and no data values were altered, estimated, or fabricated; where a WDI series lacked coverage for a given country-year, the observation was treated as missing rather than imputed, as noted in Section 3.3.

3.8 Methodological Limitations

Several design-level limitations should be noted at the outset and are revisited in light of the results in Chapter 4. First, the pooled correlation analysis used to address the fourth and fifth research questions treats up to eleven repeated observations per country as independent data points; this is a common simplification in descriptive cross-national ICT research but understates the true uncertainty relative to a formal panel model with country and year effects. Prior ASEAN research using WDI country-year panels has addressed this issue with a linear mixed-effects model that includes a random intercept for country (R. G. Atento, 2026). Second, the Digital Readiness Index is an unweighted average of three components and, as discussed in Chapter 2, prior ASEAN-specific research indicates that basic connectivity (internet, mobile) and advanced infrastructure (fixed broadband) can converge and diverge simultaneously; a single averaged score may therefore mask a tiered pattern that a component-level or weighted analysis could reveal. Third, the Index excludes e-commerce-specific indicators – such as online retail sales, digital payment adoption, or social media usage – because these are not available in the WDI database; the DRI should accordingly be read as a measure of digital connectivity readiness rather than a complete measure of e-commerce maturity. Fourth, Mobile Cellular Subscriptions can exceed 100 per 100 people due to multiple-SIM ownership, a real feature of several ASEAN telecom markets rather than a data error, and this should be kept in mind when interpreting component-level values. Finally, all relational findings in this study (RQ4 and RQ5) are correlational, not causal.

4. Results And Discussion

This chapter presents the results of the analysis of digital readiness across all ten ASEAN member states from 2013 to 2023. It is organized around the study's five research questions: the regional trend in digital readiness, country-level comparison, convergence analysis, and the relationship of digital readiness with GDP per capita and urbanization. A discussion of findings and a summary of limitations follow.

4.1 Digital Readiness Trend, 2013–2023 (RQ1)

Table 3 presents the Digital Readiness Index (DRI) for all ten ASEAN member states across the eleven-year study period.

Table 3. *Digital Readiness Index (DRI) by Country and Year, 2013–2023*

Country	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
BRN	49.2	50.2	52.4	61.7	65.3	68.1	69.3	72.1	77.2	76.8	79.5
KHM	25.5	28.3	26.0	33.4	31.8	33.2	41.7	41.7	42.1	43.1	45.7
IDN	27.6	29.0	31.7	36.6	42.8	37.7	42.3	45.4	49.4	49.5	50.9
LAO	14.9	15.5	14.0	15.9	16.3	20.0	26.7	29.6	33.1	33.5	34.5
MYS	55.9	59.2	60.5	60.8	59.8	59.7	62.4	64.6	69.9	71.7	73.7
MMR	0.0	15.9	16.4	21.8	23.3	30.2	41.2	43.2	43.2	40.3	44.0
PHL	30.8	33.1	34.7	35.7	36.6	40.2	48.1	49.9	58.2	60.6	56.3
SGP	88.0	84.8	84.8	89.1	86.1	88.1	89.8	89.5	93.5	96.2	95.5
THA	41.9	45.1	49.4	58.4	62.2	66.0	72.0	74.3	79.6	82.3	79.3
VNM	43.6	47.9	47.5	51.6	55.5	65.4	65.9	68.8	72.1	76.0	76.0

Note. Country codes: BRN = Brunei Darussalam, KHM = Cambodia, IDN = Indonesia, LAO = Lao PDR, MYS = Malaysia, MMR = Myanmar, PHL = Philippines, SGP = Singapore, THA = Thailand, VNM = Viet Nam.

The unweighted regional average DRI rose from 37.7 in 2013 to 63.5 in 2023, an increase of 25.8 points, or approximately 68% relative to the 2013 average. Every one of the ten countries recorded a higher DRI score in 2023 than in 2013, indicating a clear, region-wide upward trend in digital readiness over the study period and providing an affirmative answer to the first research question.

4.2 Country-Level Comparison and Biggest Movers (RQ2)

Table 4 ranks the ten ASEAN countries by their 2023 DRI score and reports the change in score since 2013.

Table 4. *Digital Readiness Index Ranking and Change, 2013 vs. 2023*

Rank (2023)	Country	DRI 2013	DRI 2023	Change
1	Singapore	88.0	95.5	+7.5
2	Brunei Darussalam	49.2	79.5	+30.3
3	Thailand	41.9	79.3	+37.4
4	Viet Nam	43.6	76.0	+32.4
5	Malaysia	55.9	73.7	+17.8
6	Philippines	30.8	56.3	+25.5
7	Indonesia	27.6	50.9	+23.3

8	Cambodia	25.5	45.7	+20.2
9	Myanmar	0.0	44.0	+44.0
10	Lao PDR	14.9	34.5	+19.6

Singapore ranked first throughout the study period, but its score moved the least of any country (+7.5), consistent with it already being close to the ceiling of the composite index in 2013 and having comparatively little remaining room for further gains. Myanmar recorded the largest gain of any ASEAN country (+44.0), rising from a score of 0.0 in 2013 -- the lowest possible value on the rescaled index -- to 44.0 in 2023, moving it out of last place. Thailand (+37.4), Viet Nam (+32.4), and Brunei Darussalam (+30.3) also posted large gains, each moving from the middle of the 2013 ranking into the top half by 2023. Lao PDR remained the lowest-ranked country in 2023 despite a real gain of 19.6 points, illustrating that a country's starting position continued to matter even amid broad regional improvement. Comparable persistence of cross-country gaps has been documented for other ASEAN development indicators, with Singapore and Lao PDR again at opposite ends of the regional distribution (Dela Cruz & Atento, 2026).

4.3 Convergence Analysis (RQ3)

Table 5 reports the coefficient of variation (CV) of DRI scores across the ten countries for each year, together with the CV of each of the three underlying component indicators computed separately.

Table 5. *Coefficient of Variation (CV) of Digital Readiness, Composite and by Component, 2013–2023*

Year	DRI (composite)	Internet Use	Mobile Subs.	Fixed Broadband
2013	0.609	0.746	0.358	1.181
2014	0.492	0.644	0.263	1.110
2015	0.492	0.626	0.243	1.149
2016	0.449	0.526	0.236	1.139
2017	0.426	0.469	0.264	1.031
2018	0.402	0.382	0.242	0.966
2019	0.322	0.313	0.214	0.873
2020	0.306	0.263	0.196	0.809
2021	0.301	0.213	0.200	0.764
2022	0.313	0.196	0.243	0.738
2023	0.296	0.187	0.221	0.727

Note. Lower CV indicates less relative dispersion (more convergence) across the ten countries in that year.

The composite DRI's coefficient of variation fell from .609 in 2013 to .296 in 2023 -- nearly halving -- indicating clear sigma convergence across ASEAN over the study period and providing an affirmative, quantified answer to the third research question. Decomposing this result by component shows that all three underlying indicators converged individually as well, but at very different absolute levels of inequality. Internet Use converged most sharply, from a CV of .746 to .187; Mobile Subscriptions also converged and remained comparatively low throughout (.358 to .221); Fixed Broadband, while its CV also declined (1.181 to .727), remained three to four times higher than the other two indicators in every year of the study period. In other words, fixed broadband access did not diverge within this ten-country panel, but it also never closed the gap with internet and mobile access -- it remains, by a wide margin, ASEAN's most unevenly distributed digital indicator.

4.4 GDP per Capita, Urbanization, and Digital Readiness (RQ4, RQ5)

Table 6 presents descriptive statistics for the pooled country-year observations used to address the fourth and fifth research questions.

Table 6. *Descriptive Statistics of Pooled Study Variables (N = 110)*

Variable	N	M	SD	Min	Max
Digital Readiness Index (0-100)	110	51.63	21.91	0.00	96.20
GDP per Capita (current US$)	110	13,280.56	20,542.79	1,158.05	90,299.07
Urban Population (%)	110	54.53	21.79	25.76	100.00

Note. M = mean; SD = standard deviation. GDP per capita's wide range and large SD relative to its mean reflect the inclusion of both Singapore and Brunei Darussalam (high-income) alongside Cambodia, Lao PDR, and Myanmar (lower-income) in the same pooled sample.

Table 7 presents the Pearson correlations addressing the fourth and fifth research questions, pooling all available country-year observations.

Table 7. *Pooled Correlations Between Digital Readiness Index, GDP per Capita, and Urban Population (N = 110)*

Relationship	r	p	Interpretation
DRI – GDP per Capita ($H0_1$)	.69	<.001*	Strong positive; significant
DRI – Urban Population ($H0_2$)	.77	<.001*	Strong positive; significant

Digital Readiness was strongly and significantly correlated with GDP per capita, $r(108) = .69$, $p < .001$, and with urban population share, $r(108) = .77$, $p < .001$. The null hypothesis of no relationship is rejected for both $H0_1$ and $H0_2$.

4.5 Discussion of Findings

The region-wide rise in digital readiness and the especially large gains recorded by Myanmar and Viet Nam are consistent with the technological leapfrogging literature reviewed in Chapter 2, which names both countries explicitly as examples of rapid, infrastructure-bypassing mobile and internet adoption (Pham, 2025). Myanmar's rise from the lowest possible DRI score in 2013 to a mid-table position by 2023 is a striking within-sample illustration of this pattern.

Singapore's comparatively flat trajectory alongside Myanmar's steep rise from a very low base is consistent with evidence that the marginal effect of income and infrastructure investment on digital adoption is substantially larger in low- and middle-income countries than in wealthy, near-saturated markets (Billon et al., 2021; Ünver, 2017): Singapore had little index headroom left to gain, while Myanmar had a great deal.

The convergence finding both supports and qualifies prior ASEAN-specific research. Hanif et al. (2025), examining only the top five ASEAN economies, found convergence in internet use alongside continued divergence in fixed broadband. The present study, covering all ten member states, finds that broadband did not diverge in absolute directional terms -- its CV declined like the other two indicators -- but it remained by far the most unequal of the three throughout the period. A plausible explanation for this difference is sample composition: this study's inclusion of Lao PDR, Myanmar, and Cambodia captures exactly the low-broadband-base countries whose modest absolute gains register as relative convergence, whereas a top-five-only sample would exclude the countries driving that catch-up. This suggests the ASEAN digital divide is better described as narrowing unevenly across tiers, rather than as uniformly converging or as diverging in the manner Hanif et al. (2025) found within a narrower country set. This pattern also contrasts with ASEAN capital markets over a similar period, which moved in structurally divergent rather than convergent directions (Chen et al., 2026), indicating that regional convergence in one domain does not imply convergence in others. The practical significance of such tiered gaps is reinforced by firm-level evidence from the Philippines, where manufacturing firms with high digital access reported significantly greater digital financial inclusion and supply chain resilience than firms with low digital access (R. G. O. Atento, Quinto, et al., 2026).

The strong, significant relationships between DRI and both GDP per capita and urban population share are consistent with the broader digital-divide literature identifying income and urbanization as leading structural predictors of digital technology adoption (Masaki et al., 2021; Mubarak et al., 2020). Because these correlations pool

repeated observations from the same countries across eleven years, as noted in Chapter 3, they should be read as descriptive, pooled associations; a formal panel model with country and year fixed effects would be needed to separate the cross-country income gradient from within-country growth over time, and is recommended as a direction for future analysis.

4.6 Summary and Limitations

In summary, digital readiness rose across every ASEAN member state between 2013 and 2023 (RQ1), with Myanmar recording the largest gain and Singapore the smallest as it approached the ceiling of the index (RQ2). The regional digital divide narrowed substantially over the period on the composite measure and on each of its three components individually, though fixed broadband remained considerably more unequal than internet or mobile access throughout (RQ3). Both GDP per capita and urban population share were strongly and significantly associated with digital readiness (RQ4, RQ5).

Several limitations should be considered when interpreting these results. First, the pooled correlation analysis in Section 4.4 treats repeated observations from the same country as independent, which likely understates the true uncertainty relative to a formal panel model; the reported significance levels should be read with this in mind. Second, GDP per capita's pooled distribution is highly right-skewed, driven by Singapore and Brunei Darussalam at the upper end, and the reported correlation may be disproportionately shaped by these two economies. Third, the Digital Readiness Index excludes e-commerce-specific measures not available in the WDI database, so it should be read as an index of digital connectivity readiness rather than of e-commerce maturity itself. Finally, all relationships reported in this chapter are correlational; no claim of causation is made or implied.

5. Conclusions And Recommendations

5.1 Summary of Findings

This study examined digital and e-commerce readiness across all ten ASEAN member states from 2013 to 2023 using a composite Digital Readiness Index (DRI) built from Internet Use, Mobile Cellular Subscriptions, and Fixed Broadband Subscriptions. The region-wide average DRI rose from 37.7 in 2013 to 63.5 in 2023, and every country recorded a higher score in 2023 than in 2013. Myanmar recorded the largest gain of any ASEAN country (+44.0), while Singapore, already near the ceiling of the index in 2013, recorded the smallest (+7.5). The coefficient of variation of DRI across the ten countries nearly halved over the period (.609 to .296), indicating clear convergence; decomposed by component, all three indicators converged individually, but Fixed Broadband remained three to four times more unequally distributed than Internet Use or Mobile Subscriptions throughout. DRI was strongly and significantly correlated with both GDP per capita, $r(108) = .69$, $p < .001$, and urban population share, $r(108) = .77$, $p < .001$.

5.2 Conclusions

Based on the findings, the following conclusions are drawn with respect to the study's five research questions.

1. RQ1 is answered in the affirmative. Digital readiness rose across every ASEAN member state between 2013 and 2023, confirming a clear region-wide upward trend over the study period.
2. RQ2 is answered with a clear leapfrogging pattern. Myanmar and Viet Nam posted the largest gains in the region, consistent with the technological leapfrogging literature that names both countries explicitly as examples of rapid, infrastructure-bypassing mobile adoption (Pham, 2025), while Singapore's near-flat trajectory reflects diminishing headroom at the top of the index rather than stagnation.
3. RQ3 is answered in the affirmative, with an important qualification. The ASEAN digital divide converged substantially on the composite measure and on each of its three components individually. However, convergence was not uniform across tiers: Fixed Broadband remained, by a wide margin, the most unequally distributed indicator throughout the period, even as its relative inequality also declined. The regional digital divide is better described as narrowing unevenly across infrastructure tiers than as converging outright.

4. $H0_1$ is rejected. GDP per capita was strongly and significantly associated with Digital Readiness Index scores, consistent with the broader digital-divide literature identifying income as a leading predictor of technology adoption (Mubarak et al., 2020).
5. $H0_2$ is rejected. Urban population share was strongly and significantly associated with Digital Readiness Index scores, consistent with evidence that dense urban populations lower the cost of digital infrastructure deployment (Masaki et al., 2021).

Taken together, these conclusions suggest that ASEAN's digital transformation over the past decade has been both broad-based and uneven: broad-based in that every country gained and basic connectivity converged region-wide, and uneven in that income, urbanization, and infrastructure tier continue to shape which markets are digitally mature, which are rapidly emerging, and which remain structurally behind.

5.3 Recommendations

Based on the conclusions above, the following recommendations are offered.

1. To marketing and brand managers planning ASEAN digital campaigns: evaluate markets on both their 2023 DRI level and their ten-year trajectory, not level alone. Singapore remains the region's most digitally mature market but offers little further upside on connectivity; Myanmar, Viet Nam, and Thailand represent markets where digital readiness is still rising quickly and where early positioning may carry a first-mover advantage.
2. To digital marketing and e-commerce strategists: because Fixed Broadband remains the most unequally distributed of the three indicators, campaigns and platforms that depend on heavy data usage (rich video content, large app downloads, high-bandwidth checkout experiences) are likely to encounter more friction in lower-broadband markets such as Lao PDR, Cambodia, and Myanmar than mobile-reach figures alone would suggest; lightweight, mobile-optimized formats are likely to perform more consistently across the region.
3. To telecommunications policymakers and regulators: fixed broadband infrastructure is the clearest remaining gap in the region's digital convergence story and warrants continued investment priority, even as mobile and basic internet access continue to converge on their own. Fixed broadband expansion is also shaped by the capital-intensive nature of telecommunications provision, as company-level analysis of PLDT Inc. in the Philippines illustrates (R. G. Atento & Manzana, 2026), and it sits within broader digital-governance choices, such as public data openness, that vary considerably across ASEAN+3 economies (R. G. O. Atento, Espelita, et al., 2026).
4. To regional business planners: GDP per capita and urbanization are both meaningful predictors of digital readiness, supporting income- and urbanization-informed market sequencing, but Myanmar's leapfrogging trajectory demonstrates that low current income should not, by itself, be read as a signal of low near-term digital growth potential. Market sequencing may also be informed by how ASEAN economies position themselves strategically for investors, where Vietnam and Malaysia have been found to present more coherent investor-facing narratives than the Philippines (R. G. Atento & Espelita, 2026).

5.4 Recommendations for Future Research

Several directions for future research follow directly from this study's design and limitations.

1. Construct a weighted or purpose-specific variant of the Digital Readiness Index – for example, weighting broadband more heavily for e-commerce-fulfillment research or mobile access more heavily for social-media-marketing research – rather than relying solely on the unweighted composite used here.
2. Incorporate e-commerce-specific indicators as they become available in comparable cross-country databases, such as online retail sales, digital payment adoption, or social media penetration, to move from a connectivity-readiness index toward a fuller e-commerce-maturity index.
3. Apply a formal panel-econometric model with country and year fixed effects to the GDP per capita and urbanization relationships, to separate the cross-country income gradient from within-country growth over time and address the pooled-observation limitation noted in Chapter 4. Two-way fixed-effects specifications with country and year effects, including lagged models and urban population share as a control, have already

been applied to ten-country ASEAN WDI panels and offer a workable template for this extension (Patron et al., 2026).

4. Test whether GDP per capita's relationship with digital readiness is disproportionately driven by high-income outliers (Singapore, Brunei Darussalam) by re-running the analysis with and without these two economies, or using a rank-based correlation less sensitive to extreme values.
5. Extend the country set beyond ASEAN to a broader Asia-Pacific comparison, or extend the time series as more recent years of WDI data become available, to test whether the convergence trend documented here continues.
6. Validate the Digital Readiness Index against real digital marketing or e-commerce performance data (e.g., campaign conversion rates, online sales volumes) where available, to test directly whether the Index predicts practical marketing outcomes rather than only infrastructure access.

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