

Catalyzing Digital Resilience and Sustainable Growth

Advancing Inclusive Innovation and AI-Driven
Impact Across Indonesia's Digital Economy

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01

**Catalyzing Economic
Resilience Through
Tech-Driven Impact**

Chapter 1

Catalyzing Economic Resilience Through Tech-Driven Impact

Global awareness of climate change has surged in recent years. Net-zero emissions have emerged as a guiding objective under the Paris Agreement¹ adopted at COP21, which calls on countries to hold the rise in global temperatures well below 2°C and to pursue efforts to limit the increase to 1.5°C above pre-industrial levels.

Against this backdrop of climate risk and structural change, impact investing has become mainstream. It is now treated as standard practice not only by dedicated impact funds but also by sector-agnostic investors that are integrating impact objectives into their mandates.

The Global Impact Investing Network² (GIIN) describes the impact lens as extending beyond a narrow assessment of financial risk and opportunity. It requires investors to seek both financial returns and verifiable impact outcomes, creating the potential for optimized, risk-adjusted performance. A recent meta-analysis³ of roughly 1,400 studies found a positive correlation between companies' financial performance and the strength of their environmental, social, and governance credentials.

Today, an estimated 3,907 organizations, including investment managers, pension funds, development finance institutions, philanthropic foundations, banks, and insurers, collectively manage US\$1.571 trillion in impact-investing assets under management worldwide.

That pool of capital reflects a 21 percent compound annual growth rate since 2019. In practical terms, it is US\$1.571 trillion⁴ directed toward solutions needed to confront shared global challenges and advance the Sustainable Development Goals, from climate mitigation and adaptation to financial inclusion and resilient infrastructure.

+/-3,907

*organizations managed
in impact-investing AUM*

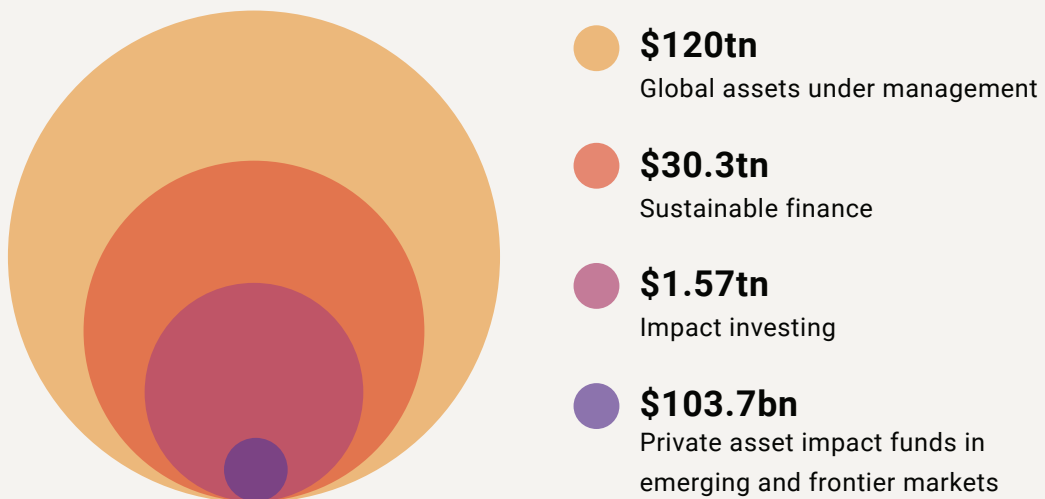
\$1.571T

*total impact-investing
AUM worldwide*

21% CAGR

*pool of capital
since 2019*

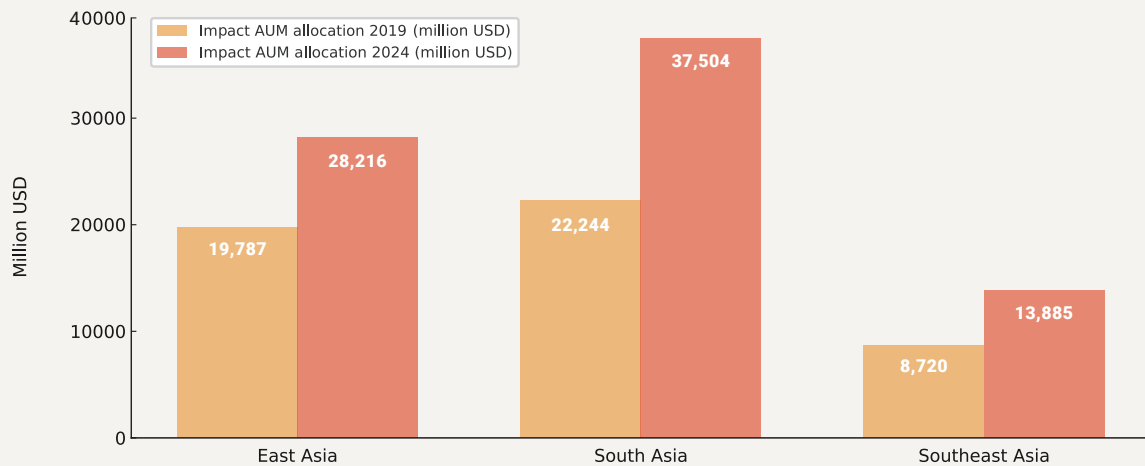
Investment Universe



Source: Private Asset Impact Fund Report 2024, A New Frontier for PAIF Strategies, Tameo Impact Fund Solutions, March 2025

Based on GIIN’s data, Asia-focused investors collectively managed US\$38 billion in total impact investing assets at the end of 2023, with an average of US\$572 million and a median of US\$98 million. Excluding one outlier, the total impact AUM managed was US\$29 billion, with an average of US\$442 million.

Impact Asset Management in Asia



Source: Global Impact Investing Network, 2024

The growth of impact investing highlights the increasing alignment of financial markets with the Sustainable Development Goals (SDGs). Achieving the Sustainable Development Goals (SDGs) by 2030 requires transformative action and the strategic deployment of innovative financing mechanisms. According to data released by ASEAN⁵, Indonesia needs an estimated US\$1.7 trillion from all sectors, including the government, to bridge the financing gap to achieve the SDGs by 2030.

In response to this pressing financing need, several collaborative initiatives have emerged to channel capital into high-impact sectors. One example is the Indonesia Impact Fund (IIF), initiated by ABAC Indonesia, Mandiri Capital Indonesia (MCI), and the United Nations Development Programme (UNDP) Indonesia. Since its launch, the IIF has mobilized US\$2.3 million to support ventures in agriculture, aquaculture, fisheries, and education—sectors vital to inclusive and sustainable growth, particularly in strengthening MSME resilience during the COVID-19 recovery.

Building on this momentum, Indonesia's startup ecosystem has increasingly embraced impact-driven models, particularly in climate technology and sustainability-focused solutions. This reflects not only global investor appetite but also local urgency to address environmental and social challenges through innovation. As a result, funding into greentech startups in Indonesia has grown steadily over the past five years, reaching its highest number of recorded deals in 2024.

MDI Ventures, the corporate venture capital arm of Telkom Indonesia, has stated its commitment to building a better, more sustainable future. As part of its innovative “thesis-driven” strategy, MDI Ventures prioritises investments in companies that do more than just make money; they also improve society and the environment.

Since its founding in 2015, MDI Ventures has managed US\$659 million in total Asset Under Management (AUM), with more than 70 total active portfolio companies. As a VC that previously employed a sector-agnostic approach, the company invests across a wide range of growth-stage companies.

MDI Ventures Director Roby Roediyanto said, “As a strategic venture capital firm focusing on creating businesses with positive values, MDI Ventures implements a thesis-driven strategy to ensure that our investments go to startups that not only generate financial gains but also have a positive environmental and social impact that benefits society.”

MDI Ventures has published annual impact reports since 2022, underscoring its commitment to impact investing. Qoala and Amarta have highlighted gender inclusion and women’s economic empowerment. In 2024, Amarta enabled more than 3,3 million women-led MSMEs to access financing products.

“MDI Ventures supports its portfolio using MDI’s dual-lens impact framework that combines commercial viability with measurable outcomes. The firm’s structured impact approach aligns with the UN Sustainable Development Goals and draws on the IRIS+ catalog of metrics.”

This framework enables portfolio companies to measure, manage, and report ESG and impact performance across seven priority themes: digital empowerment, financial inclusion, access to quality education, environment and clean energy, health, sustainable agriculture and biodiversity, and sustainability baseline reporting.

“Our policy emphasizes inclusivity, transparency, and alignment with globally accepted ESG frameworks. We prioritize investments that demonstrate a clear theory of change, integrate impact metrics from inception, and commit to ethical governance and responsible data management,” stated Roby.

02

**Enabling Access and
Resilience: Modern
Digital Infrastructure
for MSMEs and
Communities**

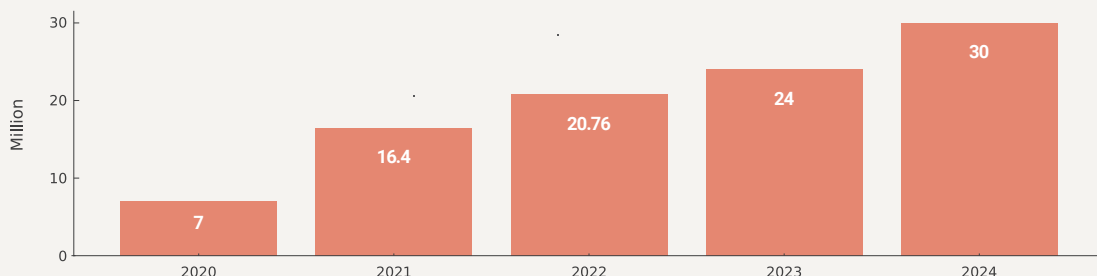
Chapter 2

Enabling Access and Resilience: Modern Digital Infrastructure for MSMEs and Communities

Micro, small, and medium enterprises are central to Indonesia's economy, contributing 60.5% of GDP⁷ and employing 96.5% of the workforce in 2022. The Ministry of Cooperatives and SMEs⁸ counts more than 65 million MSMEs as of 2024, spanning trade, manufacturing, agriculture, services, and consumer sectors such as food, fashion, handicrafts, and digital businesses.

The 2025–2029 MSME Development Policy Roadmap⁹ aims to increase high-quality employment, raise MSMEs' contribution from 3.06% in 2024 to 3.20% in 2029, and boost the entrepreneurship ratio from 3.08% to 3.60%. To support the 8% growth target by 2029, MSMEs are positioned as the main growth driver. The government is accelerating digital adoption through the MSMEs Go Online program¹⁰, targeting 50% of MSMEs to enter the digital economy by 2025, while also aiming to reach 30 million MSMEs online by 2024.

The Amount of Indonesia's MSMEs Using Digital Tools



Source: Ministry of Cooperative and SME, 2024

The COVID-19 pandemic accelerated digitization among MSMEs. In a June 2021 survey by DAI and Ipsos¹¹, 77 percent reported moving online. By 2023, that share had risen to 87 percent.

The Cybersecurity Factor: A Foundational Layer

As Micro, Small, and Medium Enterprises (MSMEs) digitize, secure digital access becomes a prerequisite for economic participation, and cybersecurity is the bedrock of trust and stability. Without it, the gains of digital infrastructure can be wiped out by outsized risk.

In Cloudflare's 2023 survey, only 53 percent of respondents said they were prepared to prevent a cyber incident. In Indonesia, 5 percent of MSMEs reported having no cybersecurity solutions in place, compared with roughly 14 percent across the Asia Pacific.

Without robust cybersecurity, the promises of innovation—like easier access to credit, digital payments for MSMEs, and new investment opportunities—crumble under the weight of risk and distrust.

Top Cyber Threats Faced by MSMEs



**SOCIAL
ENGINEERING**



**SOFTWARE
VULNERABILITY EXPLOITS**



**INSIDER
THREATS**



RANSOMWARE



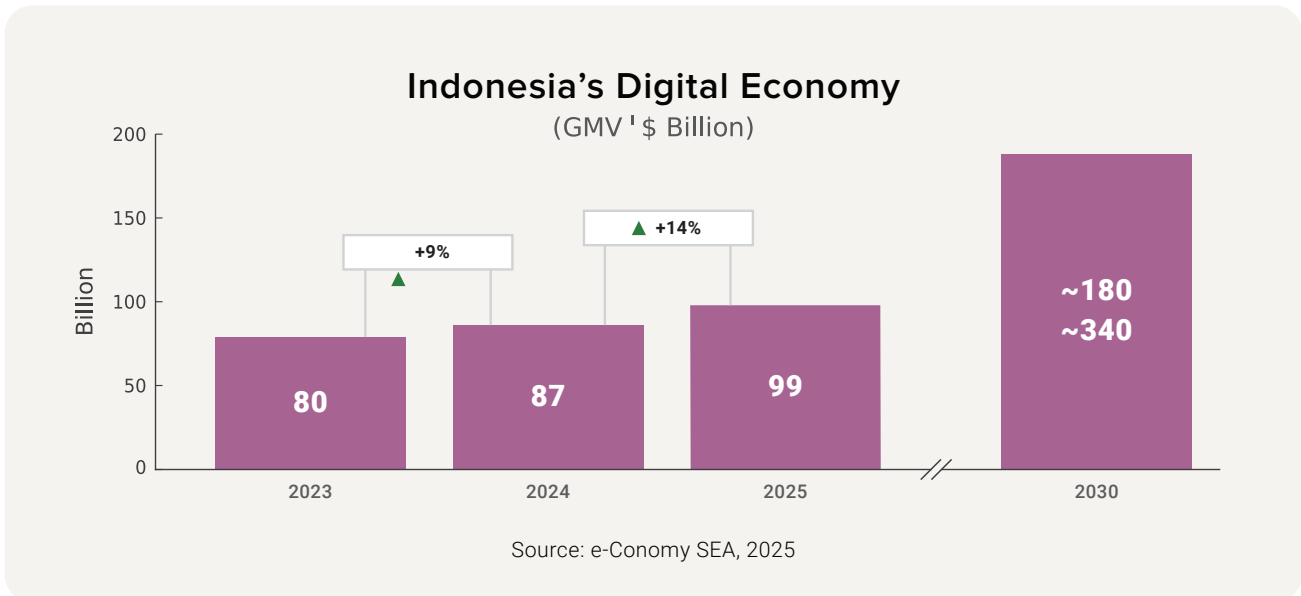
PHISHING



MALWARE

Source: Cyber Peace Institute, 2024

For millions of MSMEs and underserved communities in Indonesia, fintech offers a vital pathway to financial services previously out of reach. Digital wallets, online lending, and mobile banking can unlock access to capital, markets, and greater efficiency.



According to the e-Conomy SEA 2025 report, Indonesia's digital economy continues to grow steadily. Gross merchandise value (GMV) increased from US\$80 billion in 2023 to US\$87 billion in 2024, representing about 9% growth. The momentum is expected to continue, with GMV projected to reach around US\$99 billion in 2025, reflecting 14% growth as more businesses and consumers adopt digital services. Looking ahead, Indonesia's digital economy could expand significantly, with projections suggesting it may reach between US\$180 billion and US\$340 billion by 2030.

However, the growing use of digital platforms also increases exposure to cyber threats. These risks can lead to financial losses, data breaches, fraud, service disruptions, and reduced user trust. If not addressed properly, such threats could slow fintech adoption and affect the stability of the digital economy.

To address this, cybersecurity needs to be integrated across the fintech ecosystem. Clear regulations, strong authentication systems, advanced threat detection, and real-time fraud monitoring are important to protect users and institutions. Strengthening cybersecurity will help build trust and support the continued growth of Indonesia's digital economy.

Challenges to Address

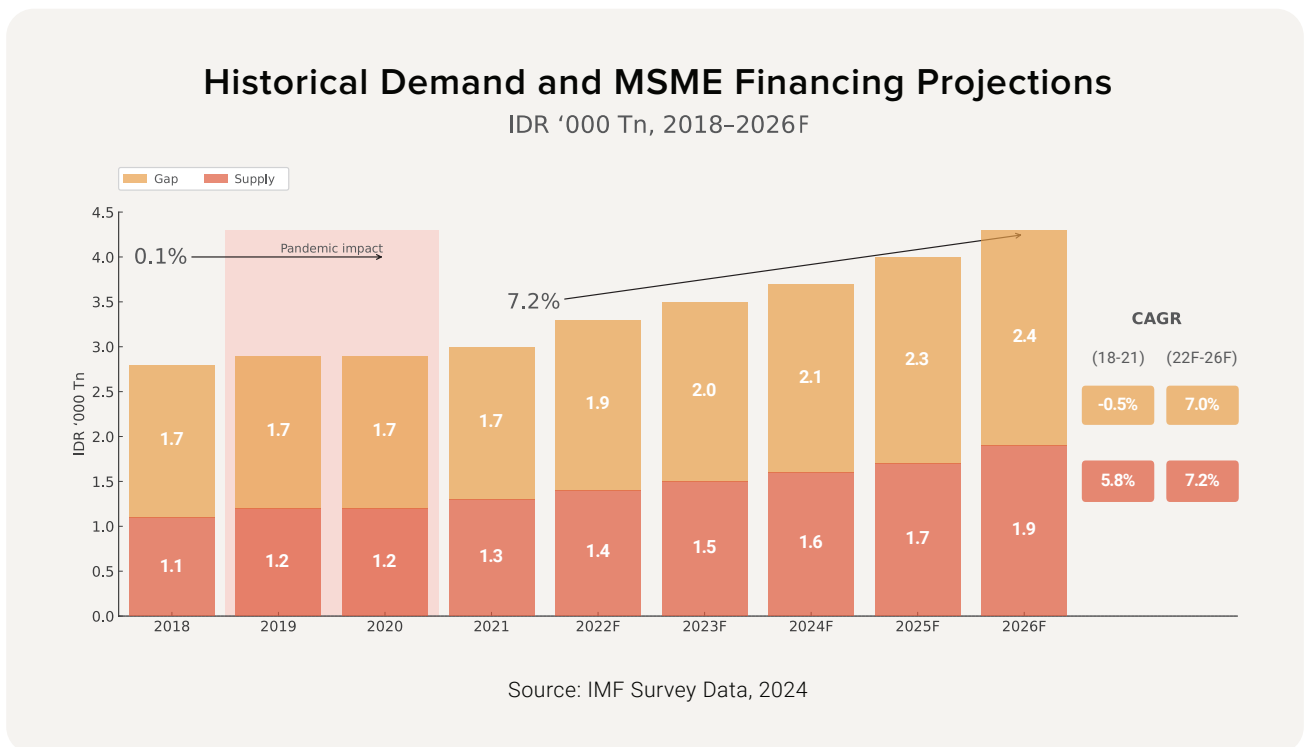
Financing Gaps

Despite strong potential, micro, small, and medium enterprises still face structural hurdles that limit scale and productivity. Addressing these constraints requires coordinated action by MSMEs, regulators, and the private sector, not piecemeal fixes.

Access to finance remains a primary obstacle. Many Indonesian MSMEs are considered unbankable because they operate informally, lack collateral, and keep limited financial records. Stringent underwriting standards, documentation requirements, and a shortage of fit-for-purpose products compound the problem, leaving viable firms without affordable credit or appropriate financial services.

According to a 2023 report by the World Bank’s International Finance Corporation¹², Indonesia’s MSME financing gap is about US\$234 billion. A separate 2023 study by Ernst & Young and the Indonesian Fintech Lenders Association projects that MSME financing needs will reach Rp4.300 trillion by 2026, or roughly US\$275–US\$290 billion at prevailing exchange rates.

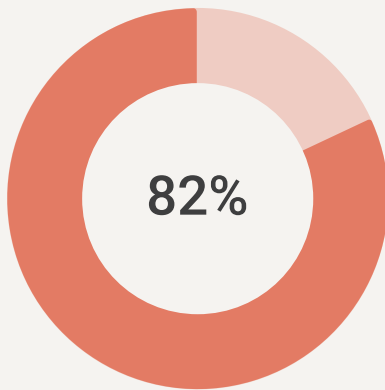
AFPI expects the gap to widen as incentives for supplying capital lag behind the rapid growth in demand. Fintech lenders are well-positioned to narrow the shortfall because their risk appetite, data-driven underwriting, and mobile-first distribution are better matched to the realities of micro and small enterprises than traditional collateral-based lending.



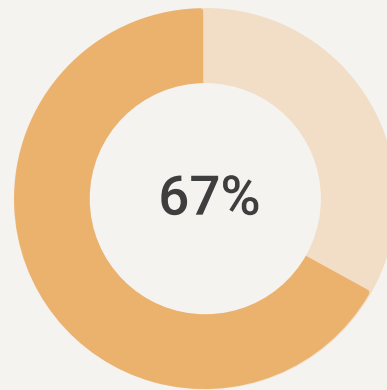
IMF survey data¹³ show that the share of small firms with a checking or savings account rose from 43 percent in 2009 to nearly 76 percent in 2023. Yet small businesses remain more exposed to liquidity strain. Only 6.3 percent report access to an overdraft facility. Access to finance has improved nationwide, but gaps persist between western and eastern Indonesia, where firms are less likely to hold basic transaction accounts.

Firms with a Checking or Saving Account

(In percent of total firms number)



West Indonesia



East Indonesia

Source: World Bank Enterprise Survey 2023, and IMF staff estimates

MDI Ventures has strategically invested in fintech startups with a notable focus on solving the critical financing gaps that hinder growth, particularly in emerging and underserved segments of the Indonesian economy. The fintech sector is a key area for MDI's impact, featuring companies like:



Amartha, a microfinance fintech platform channeling affordable working capital to women-led MSMEs in rural and non-Java areas, addressing financing exclusion in the ultra-micro segment. MDI Ventures invested in Amartha to synergize with Telkom Group to digitalize financial services and expand financial inclusion in Indonesia's unbanked rural areas.



Cermati, a digital marketplace for financial and insurance products, contributes to broader financial inclusion. The investment has resulted in positive returns for MDI Ventures, alongside Cermati's continued expansion of financial access across Indonesia.

Through these and other strategic investments, MDI Ventures leverages its corporate network and multi-fund approach to not only provide capital but also enable its portfolio companies to scale solutions that close the digital and financial divide across Indonesia.



Cybersecurity Awareness Deficits

The cybersecurity market¹⁴ in Indonesia is estimated to be worth around US\$2.05 billion in 2023. Despite this, Indonesia's cyberspace remains vulnerable, with relatively low levels of utilization of IT security programs, such as virus protection software.

A study by The Asia Foundation¹⁵, titled *"From Vulnerability to Resilience: Cybersecurity Challenges for MSMEs in the APAC Region,"* finds that Indonesian MSMEs are especially exposed to cyberattacks because of limited financial resources, low awareness, the complexity of cybersecurity, and a shortage of skilled personnel, as well as weak compliance with applicable regulations.

Management accounting tools can help firms triage those constraints. Cost-benefit analysis, cost control, and risk assessment allow MSMEs to allocate scarce resources to the highest-value controls, quantify expected loss avoidance, and prioritize implementation roadmaps. With this approach, MSMEs can understand how targeted spending on digital security raises operational efficiency and reduces expected losses from cyber incidents (Haryanto et al., 2024).

Evidence also suggests that community-based education models are effective in helping MSMEs, particularly in rural areas, adopt essential cybersecurity practices. Peer learning, local mentoring, and modular training delivered through trade associations or cooperatives can lift baseline hygiene, from stronger authentication to safer device and data management.

MDI Ventures places strategic weight on hardening the region's digital backbone through focused cybersecurity investments, reflecting an increasingly hostile threat environment in Southeast Asia. One example is **CYFIRMA**, a Singapore-based provider of threat intelligence and external threat-landscape management. MDI's investment in CYFIRMA is intended to expand access to advanced detection and response capabilities in markets such as Indonesia, where MSMEs and digital platforms are growing quickly but remain unevenly protected.



Low Tech Readiness

According to the latest survey from the Indonesian Internet Service Providers Association¹⁶ (APJII) released in August 2025, internet penetration has reached 80,66 percent, up roughly one percentage point from 2024. That equates to more than 229 million internet users out of an estimated population of 284 million.

The survey also underscores sharp regional gaps. Java posts the highest penetration at 84,69 percent and accounts for 58,14 percent of total national internet usage. Rates elsewhere are lower: Kalimantan at 78,72 percent, Sumatra 77,12 percent, Bali and Nusa Tenggara 76,86 percent, Sulawesi 71,64 percent, and Maluku and Papua 69,26 percent.

These disparities show up in MSME digitization. Many firms in rural areas still struggle to adopt and use digital tools effectively. The gap points to the need for targeted digital-literacy initiatives that reflect the age, education, and sector of business owners. Data from the Ministry of Communication and Digital Affairs¹⁷ indicate MSME digital literacy remains low at about 26 percent, highlighting persistent shortfalls in both understanding and application.

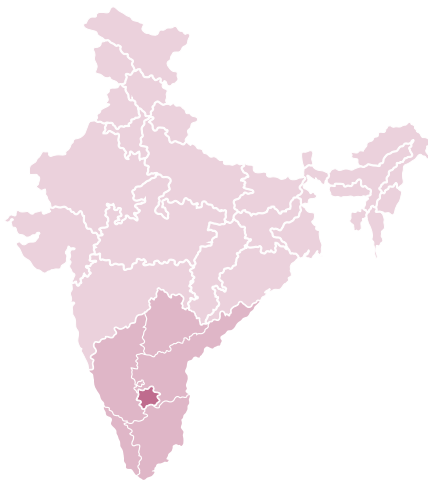
Cost remains a first-order barrier. The book *UMKM Digital*¹⁸ notes that upfront spending on hardware, software, and training can be prohibitive for micro and small businesses with thin capital bases. After adoption, many lack the resources or expertise to troubleshoot software failures, network outages, and other technical issues (Utami et al., 2024)¹⁹.

MDI Ventures' portfolio includes startups focused on lifting MSME technology readiness with accessible, sector-specific solutions, including Evermos, and Opsigo. Evermos is a social-commerce platform that empowers micro-entrepreneurs, particularly in second- and third-tier cities. Opsigo provides booking engines and travel-management systems that digitize operations for travel agents and corporate clients.

Global and Local Case Studies

A growing body of research shows that digital tools are pivotal to lifting MSME productivity. Startups that deliver these solutions have become key enablers of MSME digitization, providing affordable software, data, and training that small firms cannot build on their own. The following case studies illustrate how startup solutions accelerate digital transformation at the firm and sector level, while also improving financial literacy and formalization.

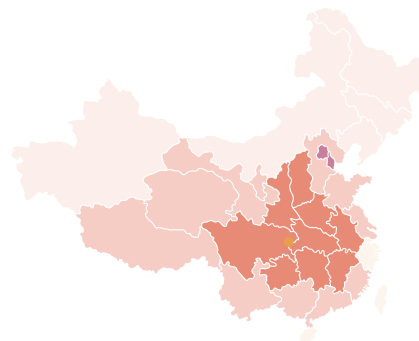
India: PhonePe, Extending Digital Finance for Every Business



Launched in 2016 on India's open UPI infrastructure, PhonePe has grown to 600 million registered users and a network of 40 million merchants across India as of 2025. The platform holds a 47% share of all UPI transaction volumes, with rural adoption growing 34% year-on-year.

Beyond payments, PhonePe expanded into a full financial ecosystem for micro and small businesses. Its SmartSpeaker, delivering audio payment confirmation in 11 local languages, enables street vendors and kirana stores with no POS hardware to participate in the digital economy at scale.

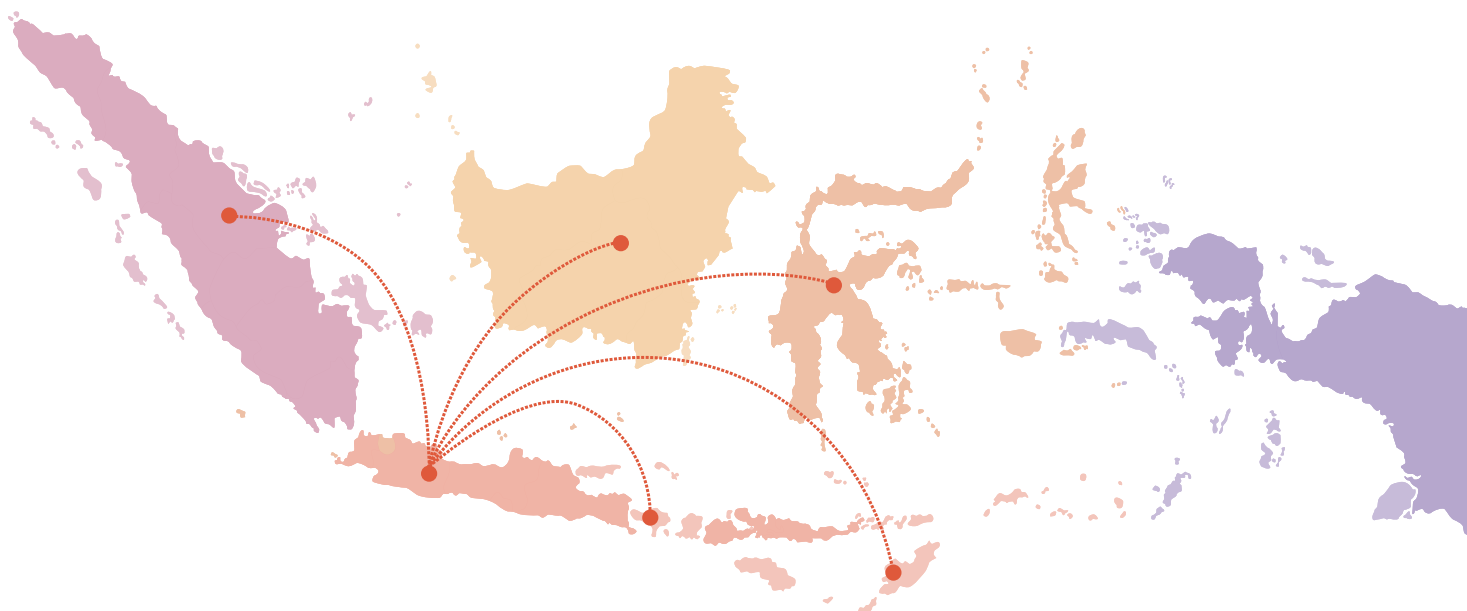
China: Alipay, The E-Commerce Giant's Financial Ecosystem



Originally launched in 2004 as a payments solution within Alibaba's e-commerce ecosystem, Alipay has evolved into a comprehensive digital financial infrastructure platform.

Since 2022, Ant Group has focused on expanding Alipay's role beyond consumer payments into MSME digital enablement. Through Alipay+, the platform now connects more than 20 international payment partners across Asia and Europe, enabling cross-border QR payments and supporting tourism and SME trade flows.

As of 2023–2024, Alipay supports over 80 million merchants globally, with a growing share consisting of small and micro businesses leveraging digital payments, marketing tools, and working capital solutions.



Indonesia: Amartha, Empowering Rural Communities

Founded by Andi Taufan Garuda Putra in 2010, Amartha's mission has always been to empower rural communities by providing affordable funding and improving the quality of life. By 2015, the company leveraged technology to streamline financial access, enhancing risk management and offering attractive returns.

As one of MDI Ventures' portfolio companies, Amartha introduced a marketplace enabling direct funding for MSMEs in rural areas. According to Amartha's 2023 impact report²⁰, it has almost 700.000 registered retail lenders and has supported over 3,3 million woman-led MSMEs. The majority of its users are located in Sumatra, Kalimantan, Sulawesi, Bali, and Nusa Tenggara.

The company has acquired a digital wallet license²¹ from Bank Indonesia. It then officially transformed into Amartha Financial²², offering expanded products from microloans, digital payments, and micro investments, zakat distribution, agency services, and PPOB (Payment Point Online Banking), supporting grassroots users in over 50.000 Indonesian villages.

Through the AmarthaFin app, investors can fund MSMEs with competitive returns. The introduction of this digital wallet feature further strengthens Amartha's position in the national financial industry.

03

**The Next Frontier:
AI-Powered Digital
Transformation for
MSME Growth**

Chapter 3

The Next Frontier: AI-Powered Digital Transformation for MSME Growth

AI as the Great Enabler for MSMEs

Many MSMEs struggle to secure growth capital to raise productivity and expand. In 2023, only 2,2 percent of micro and small manufacturers obtained bank loans as their primary source of funding, according to Statistics Indonesia (Badan Pusat Statistik, 2024). The World Bank's International Finance Corporation estimates Indonesia's MSME financing gap at roughly US\$234 billion (IFC, 2024)²³.

Lenders assess creditworthiness using credit scores that predict the likelihood of on-time repayment. Traditional scoring relies on indicators such as payment history, amounts owed, length of credit history, credit mix, and recent applications (World Bank, 2019)²⁴. MSMEs without prior formal borrowing often lack these data, creating thin credit files that impede access to affordable finance even when the underlying businesses are viable.

There are four main sources of traditional credit scores available to lenders:



SLIK, which is issued
by OJK



Fintech Data Center
by AFPI



Credit reports from Credit
Bureau Services

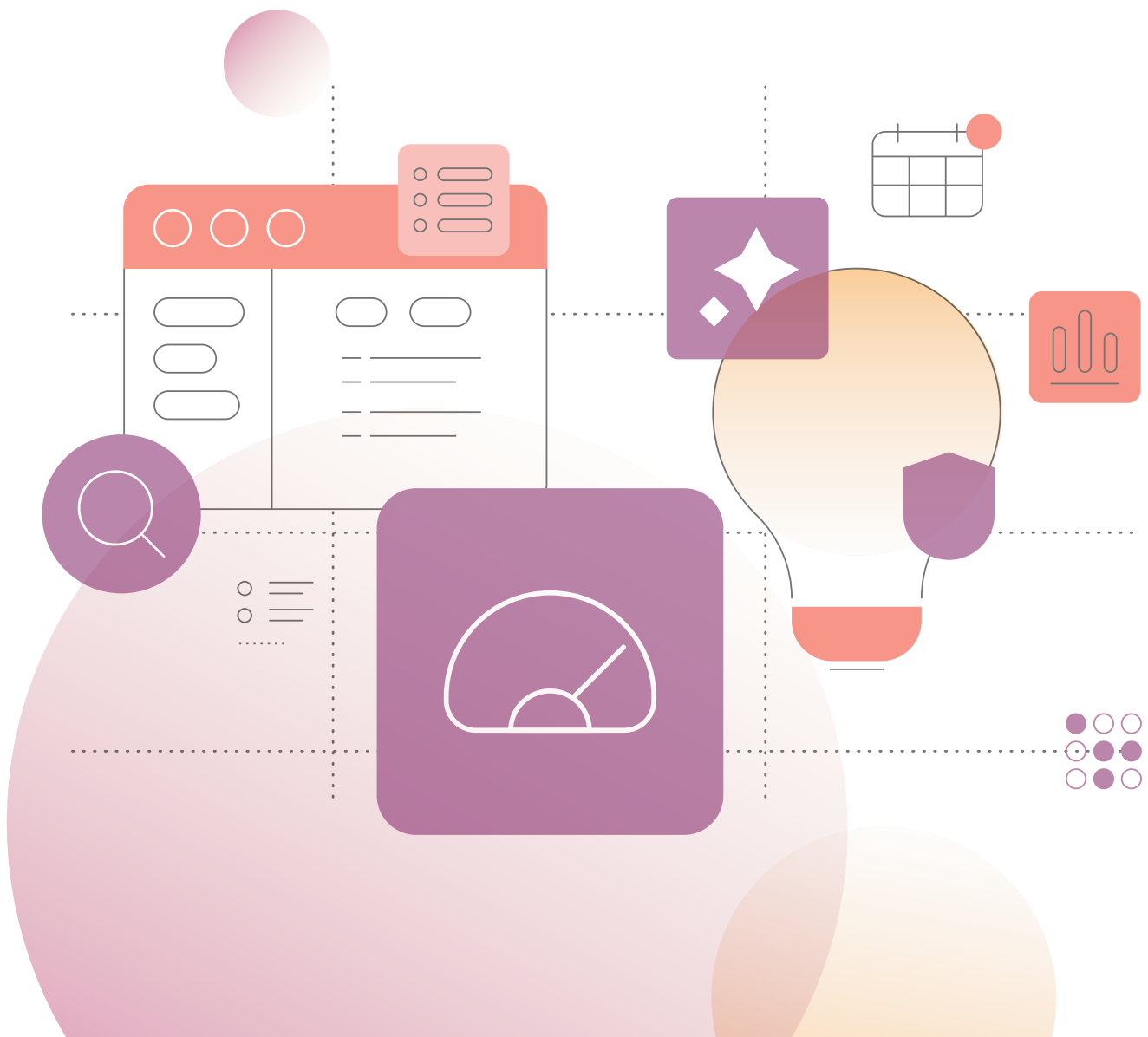


Pusat Data Fintech Lending (Pusdafil)
by OJK

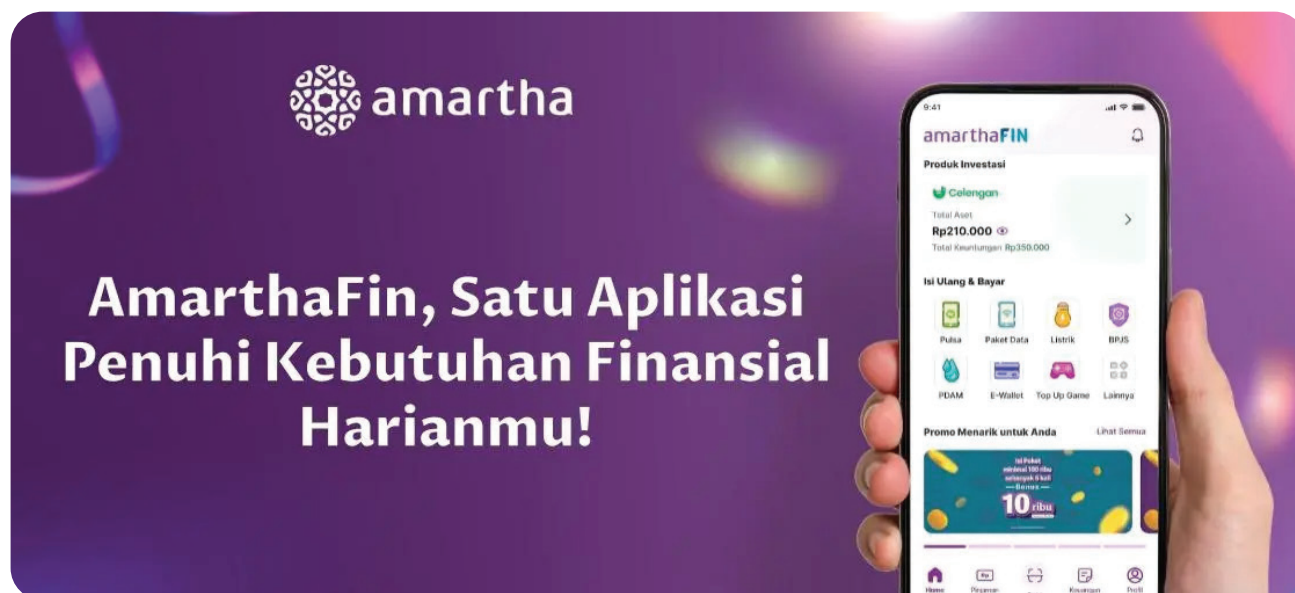
To support MSME growth, the government began exploring innovative credit scoring²⁵ (ICS) in 2022 as an alternative for individuals without prior bank loans. Instead of relying solely on repayment history, ICS combines diverse data—such as phone bills, e-commerce, social media, and household expenses—with machine learning to generate credit scores (Wijaya 2023)²⁶.

Innovative credit scoring²⁷ evaluates creditworthiness using artificial intelligence, machine learning, and alternative data. Rather than relying only on traditional files, models can incorporate on-time utility and mobile-phone payments, verified e-commerce transaction histories, device and network metadata, and other consented digital footprints. The result is a fuller picture of risk for customers who lack conventional documentation, expanding responsible access to credit.

AI is a practical enabler across the inclusion stack. It improves the accuracy and personalization of scoring, automates routine underwriting and servicing tasks, widens market reach through low-cost digital onboarding, and powers financial-health analytics that help MSMEs monitor cash flow, manage obligations, and plan investments. Used with clear governance, explainability, and consent, these tools can lower unit costs while maintaining prudent risk management.



Case Study: Amartha's AI-driven Credit Scoring



Source: Amartha

Amartha, a microfinance marketplace serving women micro-entrepreneurs in rural areas, faced a core challenge: evaluating credit risk where formal data are scarce. Rural borrowers are less likely to appear in SLIK, Indonesia's financial information service managed by the OJK, because they have limited interaction with banks and fewer formal activities such as borrowing, insurance, or investment. Traditional lenders also require collateral, which many applicants cannot provide, especially when there is no established credit history.

Amartha addresses this gap with artificial intelligence and machine learning through its scoring platform, Ascore.ai. Rather than relying on bank records, Ascore.ai blends alternative signals, including big-data features, demographic profiles, and psychometric assessments, to estimate risk for unbanked and informal-sector borrowers. The system supports automated decisions on approvals and pricing, and it strengthens portfolio monitoring, which helps the firm maintain a low nonperforming loan ratio.

Ascore.ai serves institutional and individual users. For institutions, it offers risk verification, credit underwriting, advanced credit analysis, and customer credit checks. For individuals, it provides risk-profile calculations and a credit-score simulator available on the Ascore.ai site, giving prospective borrowers a clearer view of their financial position before they apply.

Amartha's VP of Public Relations, Harumi Supit, stated that Amartha implements a strategy by learning directly from the field about the needs and characteristics of ultra-micro entrepreneurs. She explained that Amartha's strategy was built on experience over the past 15 years.

”

In addition, we are implementing a ***data-driven approach*** with our ***field staff***, utilizing ***Artificial Intelligence (AI)*** and ***prudent risk management*** to provide appropriate ***solutions or financing***²⁸.

”

Harumi Supit

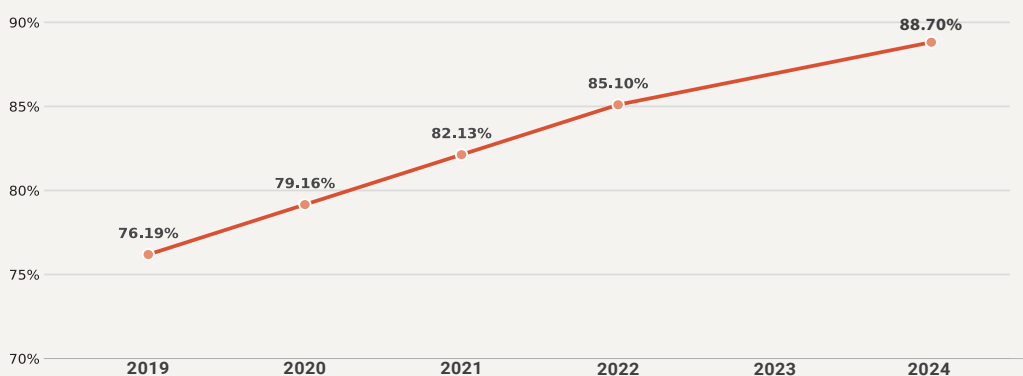
Amartha's VP of Public Relations

This strategy also enabled Amartha to maintain its aggregate non-performing loan ratio (TWP90) within a safe limit of 2,71% as of April 22, 2025. Since its inception, Amartha has disbursed over Rp28 trillion in financing to over 2,8 million Micro, Small, and Medium Enterprises (MSMEs).

The Potential of Artificial Intelligence in Democratizing Access to Financial Services

The National Survey on Financial Literacy and Inclusion (SNLIK) conducted by Otoritas Jasa Keuangan (OJK) and Statistics Indonesia shows that Indonesia continues to make progress in expanding financial inclusion. The financial inclusion index increased from 76.19 percent in 2019 to 85.10 percent in 2022, and further rose to 88.70 percent in 2024²⁹, reflecting wider access to formal financial services across the country.

Indonesia Financial Literacy & Inclusion Index



Source: SNLIK 2024 – OJK & BPS

World Bank Global Findex³⁰ 2021 data show that Indonesia has the fourth-largest unbanked population in the world, at an estimated 97.74 million adults, or about 48 percent of the adult population. The unbanked are adult individuals who lack a bank account and do not use formal financial products.

This shortfall in access underscores a central challenge for financial inclusion. Large segments of the population have limited familiarity with products beyond basic savings, which constrains resilience and growth. Technology can help close that gap.

Startups can use artificial intelligence to broaden access at scale. In insurance, for example, AI and machine learning can tailor products to individual risk profiles, automate claims adjudication and payout, and flag anomalous patterns that indicate fraud. Similar tools can streamline onboarding, verify identity, and guide customers toward responsible coverage that fits their needs and budgets.

Case Study: Qoala's Ventures in Providing Financial Security



Source: Qoala

Insurtech startup Qoala uses AI and machine learning to enhance financial security by streamlining insurance operations, detecting fraud, and creating digital platforms that make insurance more accessible and affordable.

Qoala uses AI and machine learning to automate and accelerate the claims process. Machine learning models allow Qoala to quickly detect fraudulent claims. This reduces costs and risks for their insurance partners, contributing to the financial security of the overall ecosystem.

After its Series C funding round³¹ in 2024, Qoala announced plans to further intensify its use of generative AI to enhance its agent platform, Qoala Plus. This initiative is designed to improve operational efficiency and elevate the experience for its network of thousands of independent insurance advisors.

Qoala partners with fintechs, travel platforms, and logistics companies to embed insurance directly at the point of sale, using AI to tailor pricing, streamline underwriting, and speed claims. Customers can buy affordable protection for gadget damage, travel disruptions, and loan coverage within the apps they already use, lowering friction and widening access.

The company applies the same approach across its marketplace app (Qoala App), its agent platform (Qoala Plus), and its enterprise integrations, creating a consistent experience for customers, agents, and partners while improving fraud detection and service quality.

According to Goala's 2024 impact report,

Microinsurance partnership policies in Indonesia reached ***445 million***, a ***166 percent*** increase from 2023. ***Distribution capacity*** expanded in parallel, supported by an increase of nearly ***19 percent*** to ***82,152 agents***.

The momentum reflects rising consumer trust in low-cost, fit-for-purpose products such as travel insurance, device protection, digital wallet coverage, and other tailored offerings.

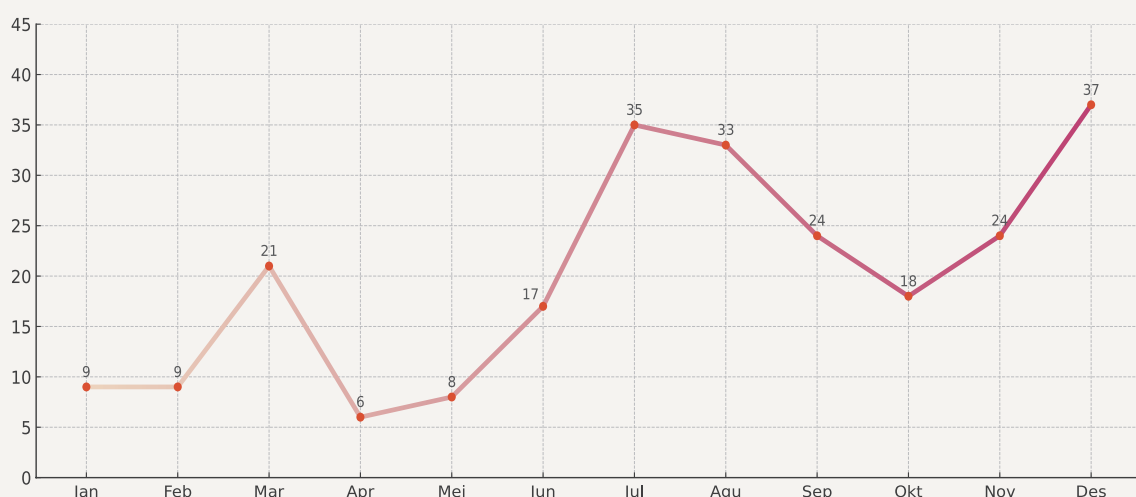
The Use of AI for Cybersecurity Inclusion

According to the Indonesia Cybersecurity Landscape Report 2024³² from the National Cyber and Crypto Agency (BSSN), authorities recorded 241 suspected data leaks. A darknet sweep identified 56.128.160 exposed records affecting 461 stakeholders. Web defacement incidents totaled 5.780 across multiple domains, including 4.071 attacks related to online gambling on government sites. BSSN's cyber complaint service received 1.814 reports in 2024.

Looking ahead to 2025, BSSN highlights likely threat vectors. Social threats include pornography, online gambling, scams, terrorist content, disinformation and misinformation, and misuse of artificial intelligence. Technical threats include website defacement, AI-driven attacks, phishing, Trojans and other malware, advanced persistent threats, denial of services, ransomware, and the trade in stolen credentials.

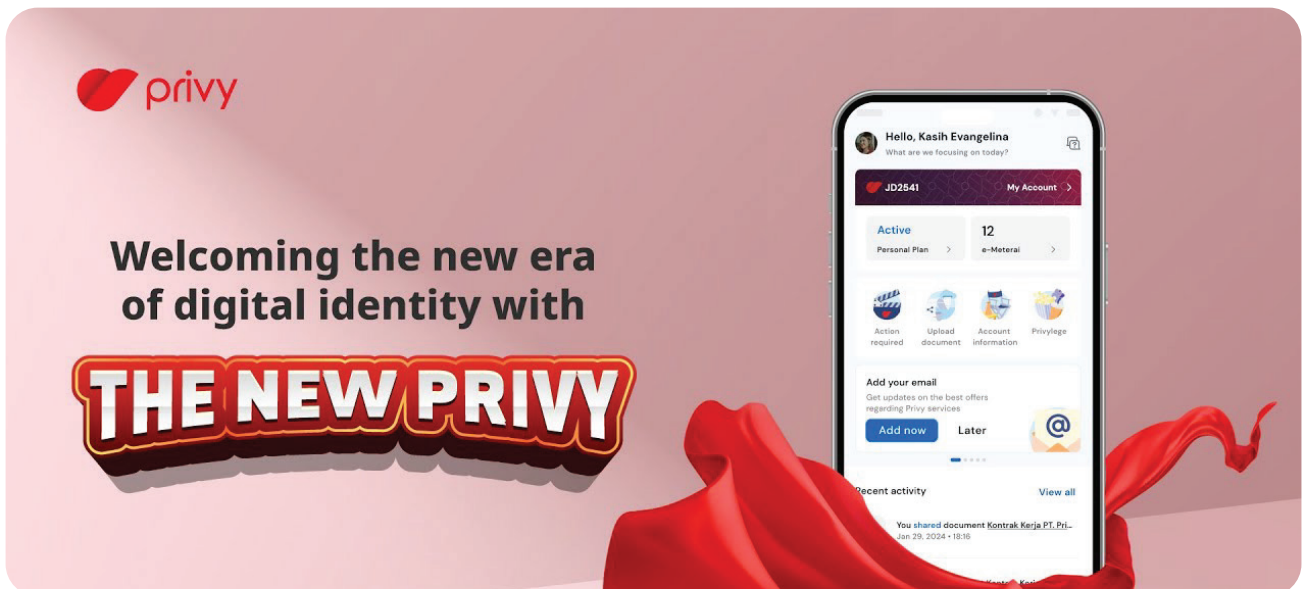
In this environment, startups play a crucial role in strengthening cybersecurity for MSMEs. These companies can deliver affordable, easy-to-deploy tools that protect digital identities, secure customers' data, and provide capabilities such as multi-factor authentication, real-time threat detection, managed monitoring, and rapid incident response. By lowering cost and complexity, they help smaller firms raise baseline security and sustain trust as they scale online.

Recapitulation of 2024 Data Breach Notification Allegations



Source: Indonesia Cybersecurity Landscape Report, 2024

Case Study: Privy in Digital Identity and Trust



Source: Privy

Privy, an Indonesian regtech firm, integrates artificial intelligence into its digital identity and trust stack, notably for liveness detection during onboarding and for predictive analytics to flag malicious activity. The goal is to harden its digital signature and electronic certificate services by verifying users in real time and strengthening the integrity of transactions and identity checks.

As an early mover in digital identity, Privy addresses security risks³³ with an end-to-end architecture that protects identities while safeguarding transactions. Its capabilities include AI-driven detection, liveness detection, biometrics, anti-spoofing controls, and encrypted digital signatures that support secure workflows from start to finish.

Headquartered in Jakarta, Privy is licensed by the Ministry of Communication and Informatics (Komdigi) as a Certification Authority (CA). By issuing the highest level digital certificates (level 4 verification) and partnering with the Directorate General of Population and Civil Registration (Dukcapil), Privy ensures that every digital transaction within its ecosystem is secure, seamless, and legally binding.

Privy expanded beyond Indonesia, becoming one of the first Indonesian digital trust tech companies to operate in the Australian market, reflecting early steps toward international growth. Privy has been active in promoting digital verification habits and awareness around document authenticity. It partnered with authorities (Kominfo/Komdigi) to encourage verification of digital documents before trusting them especially given rising fraud.

”
We reached a ***national milestone*** as the ***provider of Digital Signatures*** in the National Procurement System (INAPROC), ***empowering thousands of SMEs in the government e-catalog*** to transact more ***prudently and transparently*** while ***driving efficiency*** for corporate users.
”

Marshall Pribadi

Privy's founder and CEO

Privy reports more than 57 million verified users and over 144 million documents digitally signed from more than 4.733 enterprise clients across banking, multifinance, insurance, and technology. Management says the company remains financially sound³⁴ and is on track to reach EBITDA neutrality as of the third quarter of 2025.

Case Study: Cyfirma for Cybersecurity Empowerment



Source: Cyfirma

CYFIRMA is a Singapore-based cybersecurity company that combines cyber intelligence, attack surface discovery, and digital risk protection to provide early threat warnings. Its AI-powered platform helps organizations see risks from a hacker's perspective, allowing them to prevent attacks before they happen. Headquartered in Singapore, with offices in Japan, India, the United States, and the European Union, CYFIRMA serves government agencies and Fortune 500 companies across multiple industries.

CYFIRMA recently announced a partnership³⁵ aimed at strengthening security for SAP customers. The collaboration pairs CYFIRMA's external threat intelligence with SecurityBridge's deep expertise in SAP-specific vulnerabilities and risks, giving organizations a more complete view of their exposure.

SAP systems sit at the core of many enterprises and run critical functions such as finance, logistics, and human resources. Securing them requires two complementary lines of defense: protection against external threats and remediation of SAP-specific weaknesses, along with internal risks. Through this partnership, CYFIRMA and SecurityBridge will equip businesses with predictive and personalized intelligence so teams can detect, prioritize, and respond to security risks more effectively.

MDI Ventures has recently made a strategic investment in CYFIRMA³⁶ in January 2025. The investment aims to boost CYFIRMA's growth and enhance its global cybersecurity solutions for enterprises, particularly in Southeast Asia.

This funding will enable CYFIRMA to expand its market reach, especially in Indonesia, and extend into other global markets. It will also fuel the startup's R&D initiatives, allowing it to enhance its capabilities in countering advanced cyber attacks.

”

SAP environments are ***high-value targets for cybercriminals***, and businesses need to ***look beyond their internal security measures.*** ”

Sam Parmar

Global Head of Strategic Alliances at CYFIRMA

CYFIRMA partnership with SecurityBridge enables organizations to not only understand their internal risks but also stay ahead of external threats that could exploit SAP vulnerabilities. The combination of external threat data with SAP-specific security intelligence allows organizations to take proactive security measures, reducing the likelihood of breaches and minimizing damage from cyberattacks.

The Use of AI for Emerging Opportunities

Indonesia's National Artificial Intelligence Strategy 2020–2045 (Stranas KA) sets the direction for AI development and aligns it with the Indonesia Emas 2045 vision. The strategy positions AI as a cross-cutting enabler in several priority domains:

Health Services



Accelerate smart-hospital initiatives and strengthen post-COVID-19 health security infrastructure.

Mobility and Urban Development



Advance the 100 Smart Cities movement, including 98 smart cities

Health Services



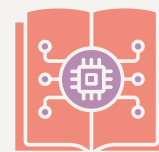
Deliver community-centered digital public services.

Food Security



Through smart agriculture, fisheries, and natural resource management.

Education & Research



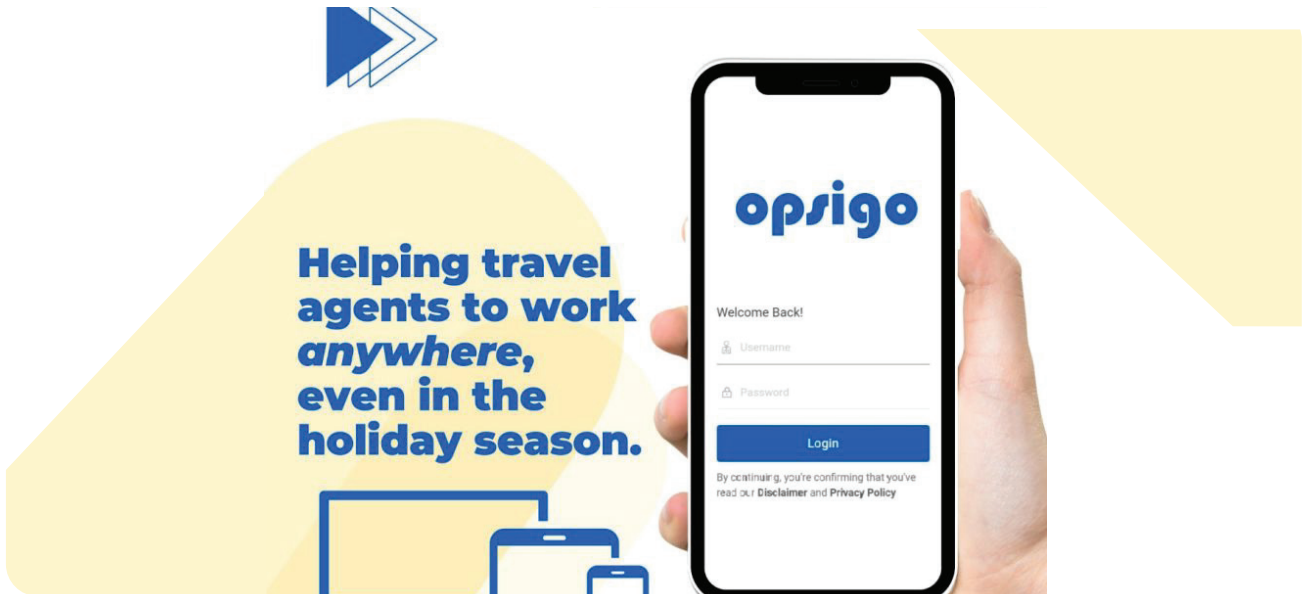
Support online learning and reduce the digital divide.

The government views AI as a driver of digital transformation and a key pillar of Indonesia Emas 2045. Policymakers project that effective AI adoption can help the economy achieve annual growth of about 8 percent over the long term by raising productivity, improving service delivery, and catalyzing new industries.

According to the AI Report 2024, "AI Sovereignty to Empower Indonesia"³⁷, The Director General of Digital Government Technology at Komdigi, Mira Tayyiba, believes that AI technology can improve conventional yet pivotal sectors such as agriculture, maritime affairs, and food security, which can bring significant changes to Indonesia's sustainable development.

Besides all the emerging verticals that are included on the Stranas KA, there are still other potential opportunities that can be leveraged from AI. One of them is tourism, which contributed 4% to Indonesia's GDP³⁸ in 2024. Artificial Intelligence can be used by the tourism and hospitality industry by automating operations, enhancing customer experiences, and creating highly personalized services. It is changing how travelers plan, book, and enjoy their journeys, while helping businesses maximize revenue and efficiency.

Case Study: Opsigo Using AI for Its Business Travel Management



Source: Opsigo

Established in 2014, Opsigo is a leading online travel platform that serves roughly 70 percent of Indonesia's traditional travel agency market. Its current product focus is Opsicorp, a travel management system that uses artificial intelligence and cloud computing to help corporations manage business travel end-to-end.

With Opsigo's tools, agencies can digitize and automate routine workflows, freeing agents to focus on client relationships and complex itinerary design. Corporations, meanwhile, can manage travel and expenses quickly, securely, and at scale through Opsicorp, which taps the broader business travel ecosystem Opsigo has built.

According to the company's 2024 impact report, Opsigo expanded into Singapore and Malaysia, marking an initial step toward regional scale in Southeast Asia. Financial results tracked the expansion. Revenue rose 23 percent from 2023, while earnings before tax increased 143 percent, underscoring the scalability and resilience of the model.

Opsigo has been profitable since 2023, following a US\$1,25 million investment from Genesis Ventures and MDI Ventures in 2019. In 2024, the company raised a Series A round to support continued growth and market entry.

The 2024 report also notes that Opsigo recorded US\$700 million in gross transaction volume, booked more than 600,000 hotel rooms, and issued airline tickets valued at more than US\$3 million.

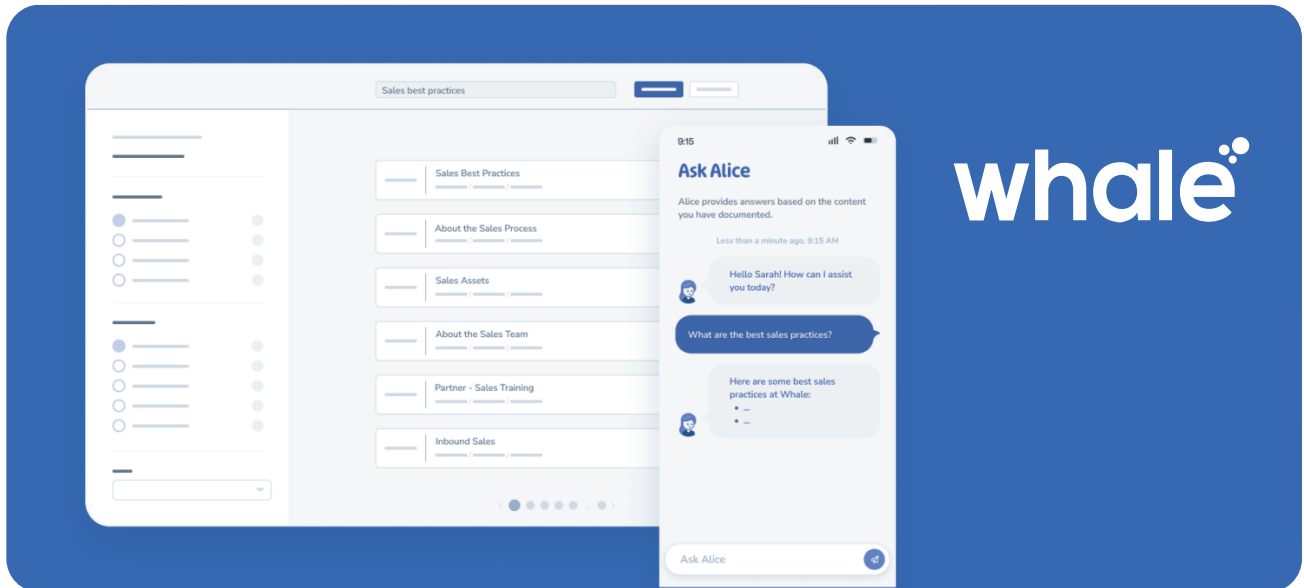
”
Building on this *momentum*, we are preparing for further *expansion* into the *Philippines, Thailand, and Vietnam* in *2025*, strengthening our commitment to serve a *broader market* with *reliable, technology-driven solutions*.
”

Edward Nelson Jusuf

Opsigo's chief executive, who has more than 25 years of experience in business travel.

As one of MDI Ventures' portfolio companies, Opsigo, through Next Billion Ecosystem Festival (Nex-BE Fest)³⁹ has successfully collaborated with Indonesia Financial Group. The company was recently selected⁴⁰ for the Google for Startups Accelerator program, signaling its commitment to developing AI-driven travel solutions.

Case Study: Whale's MSMEs Applications



Source: Whale

Whale is a Singapore-based enterprise AI company that builds AI-native products to help businesses automate operations, accelerate decision-making, and gain deeper customer insights. Its platform integrates advanced AI, IoT, and data infrastructure, providing a secure and scalable foundation for intelligent transformation.

The company has developed more than 60 fine-tuned private AI models for enterprise use and continues to invest in generative AI, IoT infrastructure, and data operations.

Roughly 30 percent of Whale's clients are automakers, including BYD, Ford, and NIO. Consumer brands such as Oppo, Starbucks, and ZUS Coffee also use Whale's technology to analyze customer behavior.

Whale raised a total of US\$60 million in its Series C financing to help businesses drive sales with its AI assistant. The company was founded by Jerry Ye, a former Meta data scientist. New investors in the Series C2 round included BOSCH Ventures, Singtel Innov8, MDI Ventures, MTR Lab, and Gentree Fund, according to the company.

Whale's latest fundraising exercise came almost four years after it raised a US\$50-million Series B round led by Temasek⁴¹ alongside returning investors NIO Capital, Linear, and Alpha Startups. The startup was originally founded in Hangzhou, China, subsequently set up its headquarters in Singapore in 2022. The company is also expecting to see positive net cash flow this year.

”

We're focused on *pushing the boundaries of enterprise AI—combining deep tech* with real-world *operational impact.*

”

Jerry Ye

Founder & CEO of Whale

In addition, Whale is expanding its services into Indonesia's banking and financial services sector by developing new use cases based on voice intelligence and AI agents to support regulatory compliance and customer interactions. The company also plans to expand into the consumer electronics sector.

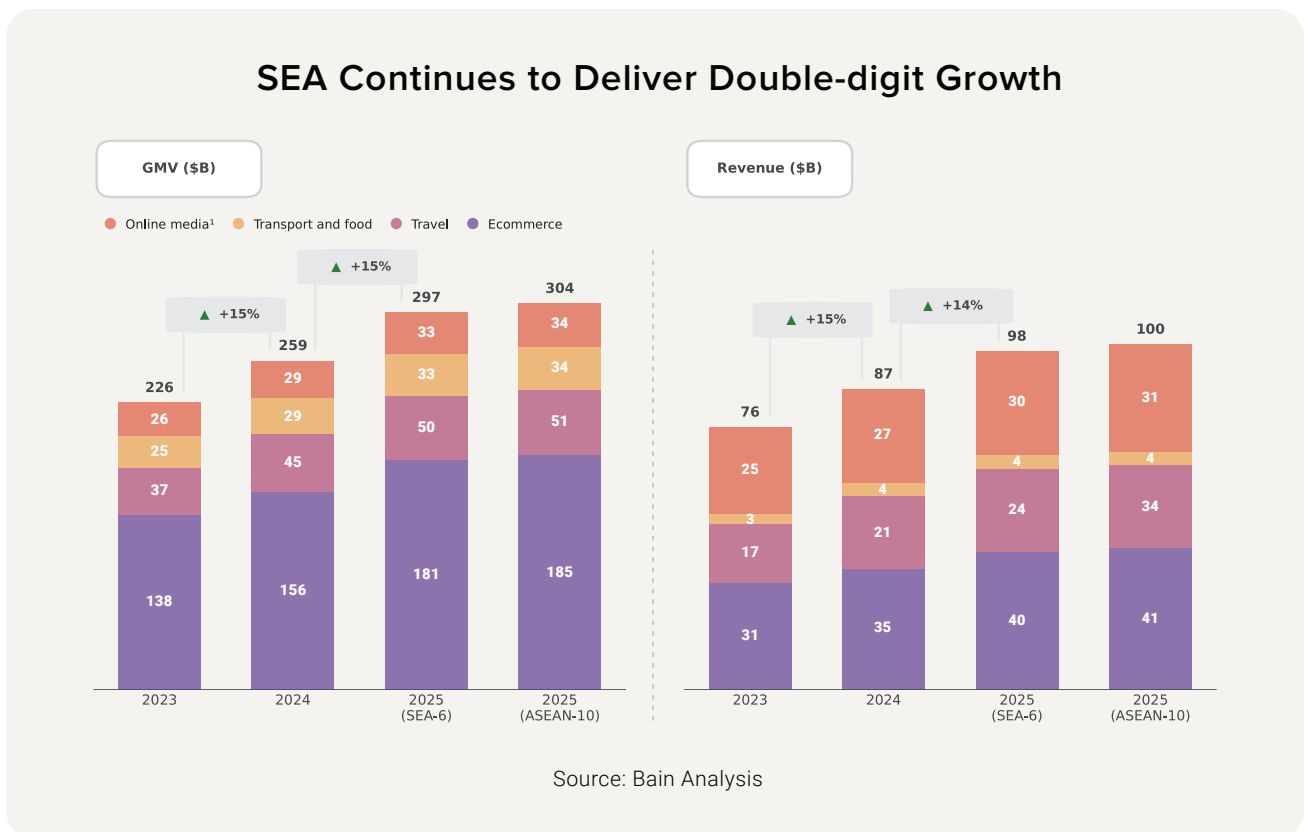
04

MDI Ventures' Strategic Blueprint for Future Challenges

Chapter 4

MDI Ventures’ Strategic Blueprint for Future Challenges

SEA’s digital economy is on a strong trajectory to surpass US\$300 billion in GMV in 2025, according to the latest report⁴² by Google, Bain, and Temasek. The report stated that several sectors will arise in the near future, including digital finance and AI solutions, which are aligned with MDI Ventures major shift investment⁴³ as announced earlier in 2025.

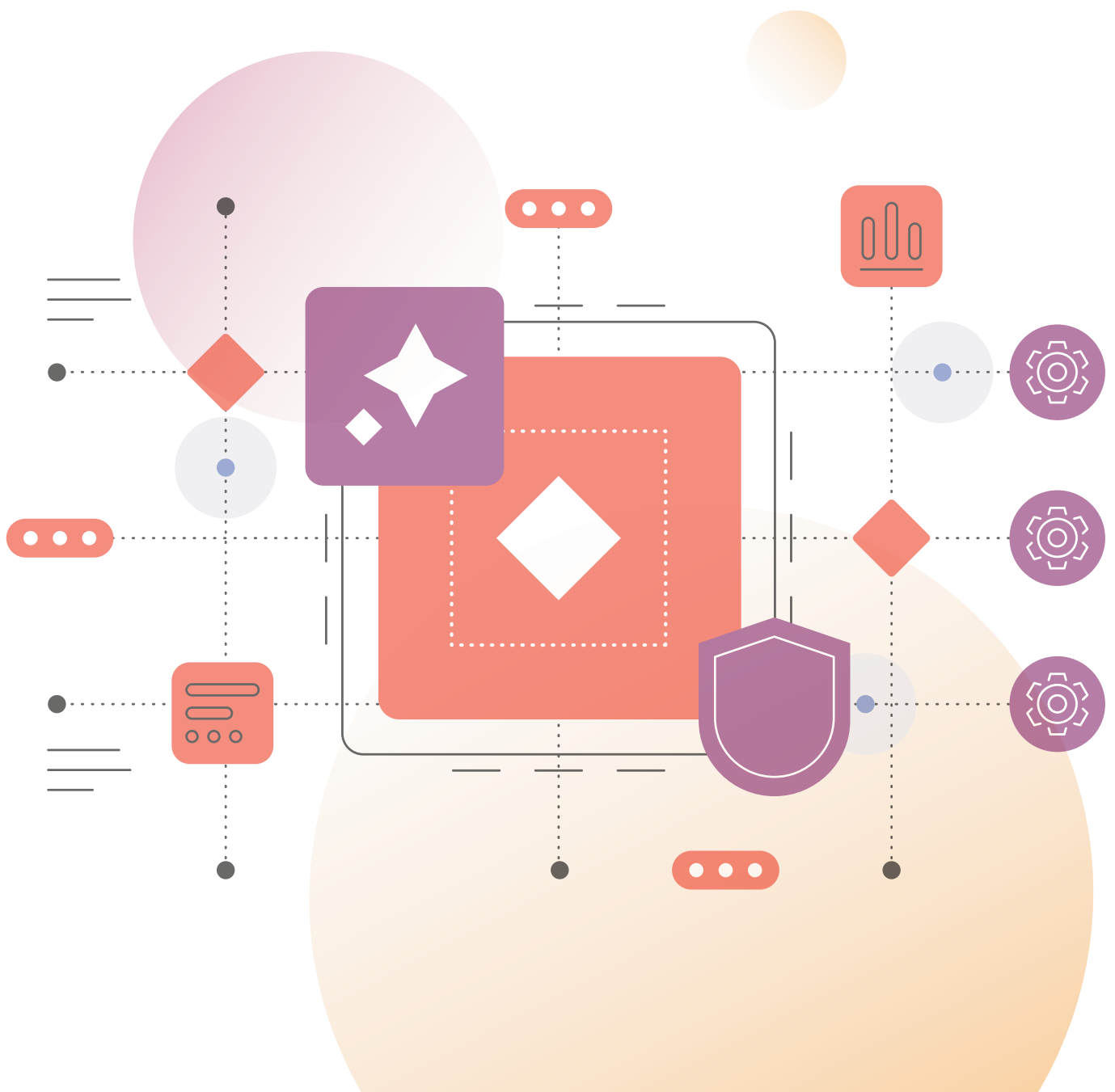


According to the report, among more than 680 AI startups in SEA, the majority (495+) are located in Singapore, solidifying its position as the region’s AI hub. Meanwhile, Indonesia has more than 45 AI startups, ranking third in the region after Singapore and Malaysia, signaling the big potential of AI development in the country.

Many venture capital firms have invested in AI, including MDI Ventures. The company participated in a US\$60 million Series C investment in Singapore-based Whale, and also invested in AI-driven threat intelligence platform Cyfirma.

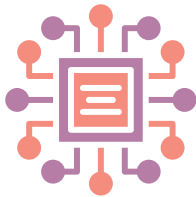
Besides AI, the digital finance solutions sector in SEA is also strengthening beyond payments. According to the report, embedded lending solutions targeting underserved segments are doing well, and multiple digital wealth platforms have surpassed US\$1 billion in assets under management (AUM).

Digital finance solutions have long been a key investment area for MDI Ventures in Indonesia. The company has invested in Amarta, Cermati, Qoala, among others. In addition to this, MDI Ventures, through its angel investor network, eMerge⁴⁴, also backed blockchain startups, signaling its support to make Indonesia a global player in the blockchain industry.



Challenges Ahead

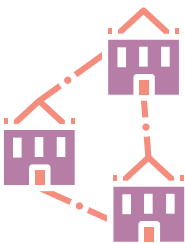
In order to benefit from the rising sectors in the future, some structural challenges need to be addressed by all stakeholders in Indonesia's tech ecosystem. Those challenges include:



Infrastructure and Connectivity Gaps

The growth of high-tech sectors is fundamentally reliant on high-quality infrastructure, which remains highly uneven in Indonesia. While Jakarta and major cities have excellent 4G/5G coverage, large parts of the outer islands still struggle with slow, unreliable internet access.

This condition leads to uneven tech readiness, especially among MSMEs. According to the Ministry's Single Data Information System, over half of Indonesia's 30 million MSMEs—around 16 million—still rely on manual or semi-manual equipment.



Data and AI Governance

Establishing clear regulations for data privacy, data localization, and AI ethics is crucial for building trust in the digital finance and AI sectors. Otoritas Jasa Keuangan (OJK) has issued AI Governance Guidelines for Banking, aligning with global frameworks.

However, studies show that unclear data governance remains a barrier, slowing innovation and deterring international investors who prioritize compliance and ethical standards. Indonesia's data governance framework requires adjustments in key areas, namely specificity, enforceability, and adaptability, while also promoting stronger cooperation among stakeholders.



Financing and Funding Constraints

Indonesia's tech ecosystem needs to regain investors' trust by strengthening its governance and paths to profitability. According to DealStreetAsia's "Southeast Asia Startup Funding Report: H1 2025⁴⁴," venture capital funding in Indonesia was just US\$ 80 million in the first half of the year, a steep drop from the US\$ 200 million logged during the same period in 2024.

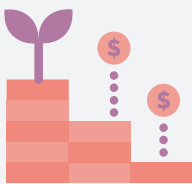
Building for Resilience

As the corporate venture capital arm of Telkom Indonesia, MDI Ventures is currently managing US\$ 659 million asset under management (AUM) and has over 70 startups in its portfolio, three of which have successfully become unicorns. The company has successfully executed 17 investment exits, including 4 IPOs.

The company acts as a bridge between TelkomGroup, enterprises, and innovative founders with a focus on creating synergies and scaling business globally. The cumulative synergy value created through MDI's ecosystem is estimated to reach over Rp16 trillion from 2016 to 2024.

Financial performance, along with social and environmental impacts have always been the core value of MDI Ventures, which operates with six strategic pillars that differentiate it from other VC firms:

Financial Performance



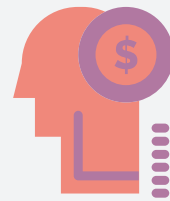
MDI Delivers Robust Returns by Investing in Scalable Firms

Grow Fundraising Platform



MDI Continuously Expands Capabilities in Raising Funds

Active Investor



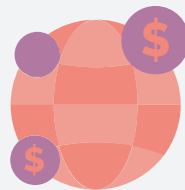
MDI Takes a Hands-on Approach in Supporting Investments

Synergy



MDI Creates Win-Win Synergy Between TELKOM, SOEs, and Startups

Enabling Impact through Digital



MDI Leverages Technologies to Drive Positive Social Outcomes

Risk & Compliance



MDI Adheres to Global Fund Management Laws and Standards

Moving forward, MDI Ventures will continue to invest in startups that have proven their impact on society and contribute to UN SDGs by leveraging technologies.

MDI uses the IRIS+ measurement, developed by the global Impact Investing Network (GIIN) and focuses on several prioritized impacts, including:



By aligning its investment with national priorities, leveraging its partnership with Telkom Group, and committing to measurable impact, MDI Ventures illustrates how capital can be deployed not only to generate returns but also to contribute to tangible socioeconomic impact as mandated by the UN SDGs.

05

Action Plan to Realise the Impactful Digital Economy in Indonesia

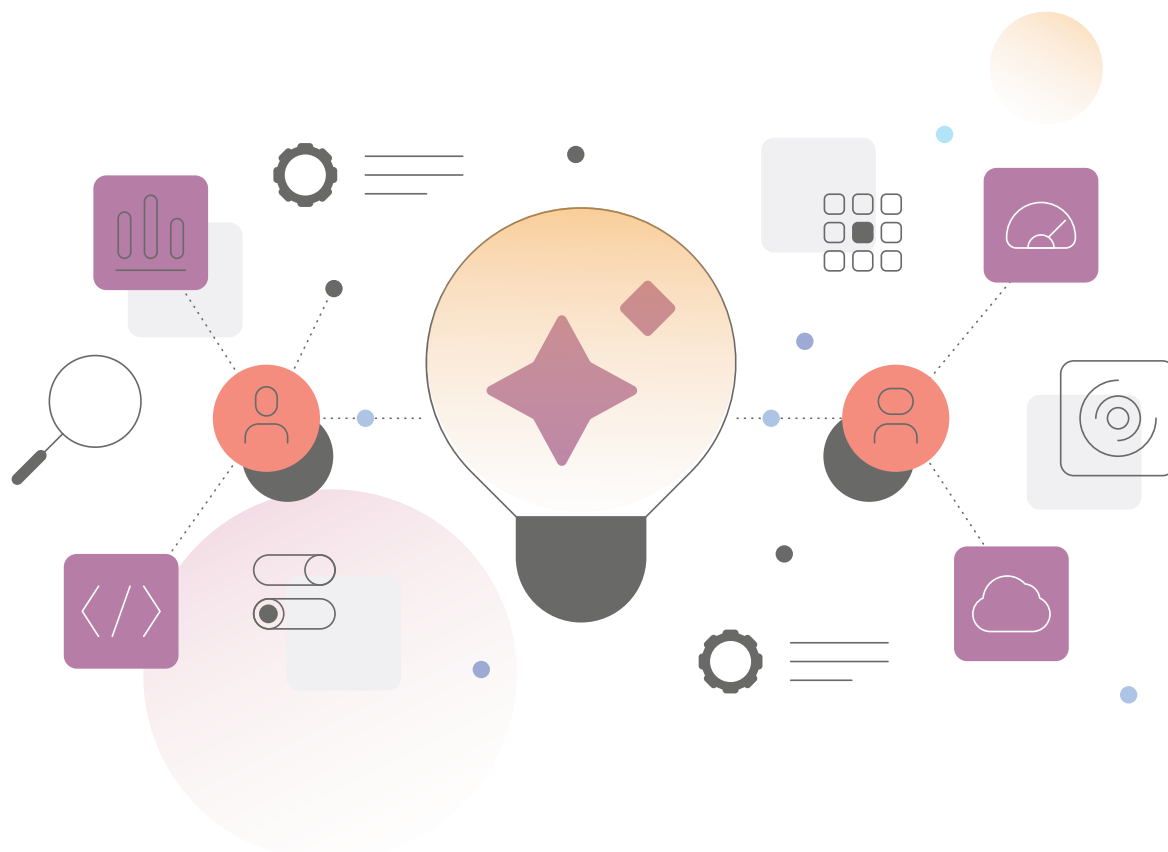
Chapter 5

Action Plan to Realise the Impactful Digital Economy in Indonesia

The transition to an inclusive and impactful digital economy requires collaboration from all stakeholders in the digital ecosystem, including startups, investors, and regulators. The following table provides a strategic action plan detailing the specific responsibilities of each stakeholder to mitigate these structural challenges and drive sustainable growth, realizing socioeconomic and environmental impact.

	Startup	Investor	Regulator
Infrastructure & Connectivity Gaps	Startups should build simple, low-data products and work with telecom providers to expand access beyond major cities.	Investors should fund startups that improve infrastructure and expand connectivity in underserved areas.	Regulators should provide incentives and support infrastructure sharing to speed up rural coverage.
Data & AI Governance	Startups must follow data protection rules and use AI responsibly.	Investors should back startups with strong data governance and ethical AI practices.	Regulators should enforce data laws and oversee AI to prevent misuse.
Financing & Funding Constraints	Startups should focus on profitability and healthy cash flow while seeking diverse funding sources.	Investors should prioritize sustainable revenue and use risk-sharing funding models.	Regulators should support VC and impact funding through incentives and grants.
Social & Environmental Impact (SDGs)	Startups should align with SDGs, measure their impact, and work with NGOs and the government.	Investors should prioritize impact-driven businesses and include impact in decision-making.	Regulators should support SDG reporting and encourage impact-focused innovation.

Emphasis on Collaboration



Unlocking Southeast Asia's projected US\$ 300 billion digital economy will depend on resilience as much as expansion. While emerging sectors like AI, cybersecurity, and digital finance align perfectly with MDI Ventures' refined investment focus, the full potential remains constrained. The challenges, including infrastructure gaps, unclear data governance, and funding constraints in the current funding environment, require systemic intervention.

The key to overcoming those structural challenges lies in the collaboration among all ecosystem stakeholders. As the corporate venture arm of Telkom Group, MDI Ventures has become a crucial bridge, driving synergy between its diverse portfolio companies and large enterprises, whether it is a state-owned or private enterprise.

The company is also proactive in fostering institutional partnerships, collaborating closely with the government and universities, through strategic partnerships, investments, and startup incubators/accelerators.

Furthermore, MDI Ventures encourages its portfolio companies to make impact reports using international standards, such as the IRIS+ measurement framework. This action ensures that MDI Ventures's investments not only contribute to positive financial returns, but also to the tangible socioeconomic impact as mandated by UN SDGs.

Summary

This white paper explains how digital innovation and impact investment can support Indonesia's economic growth. It focuses on how technologies like artificial intelligence (AI), digital finance, and cybersecurity can improve efficiency, expand financial access, and help MSMEs grow.

The first section outlines the rise of impact investing globally and in Asia, highlighting the growing alignment between financial performance and measurable environmental and social outcomes. It explains how impact capital is becoming an important tool to help address Indonesia's structural financing gap while supporting progress toward the Sustainable Development Goals (SDGs).

The second section examines the essential role of digital infrastructure, financial inclusion, and cybersecurity in enabling MSMEs to grow and compete. Although Indonesia's digital economy continues to expand, many MSMEs still face barriers such as limited access to finance, low digital literacy, and uneven connectivity. Through case studies including Amartha, Qoala, Privy, and CYFIRMA, the paper shows how startups are helping close these gaps by using AI, alternative credit scoring, digital identity solutions, and stronger risk management tools.

The third section explores artificial intelligence (AI) as the next frontier for MSME transformation. AI supports more inclusive credit assessment, improves fraud detection, automates operations, and enhances business decision-making. By increasing efficiency and strengthening trust in digital systems, AI helps widen access to financial services and drives greater productivity across sectors.

The fourth section presents MDI Ventures' strategic blueprint, describing how a thesis-driven and impact-oriented investment approach—supported by strong governance, risk management, and ecosystem collaboration—can deliver both financial returns and measurable socioeconomic impact. The paper concludes that collaboration among startups, investors, regulators, and enterprises is key to building a resilient and inclusive digital economy, ensuring that digital transformation contributes not only to growth, but also to long-term sustainable development.

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