

# Artificial intelligence – Driven Sustainable Technology & Development

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# Sustainable Development

- Sustainable development seeks to meet the requirements of the present generation while preserving the ability of future generations to meet their own needs (Mariani, et al, 2022).
- The three fundamental pillars are as follows: **(1)** economic development involves achieving long-term growth and prosperity; **(2)** social responsibility includes guaranteeing social fairness, community welfare, and poverty alleviation; and **(3)** environmental stewardship entails ensuring the sustainability of natural resources and ecosystems.

# The Role of Sustainable technology

- Sustainable technology is defined as technology developed or deployed with environmental, social, or economic sustainability in mind (Hansson et al, 2021; Hoque et al., 2023).
- Sustainable technologies are classified into four types: reducing carbon dioxide and other greenhouse gas emissions, material or fuel substitution, material or energy efficiency, and recycling technologies.
- Sustainable technology promotes sustainable development by balancing economic growth, social welfare, and environmental preservation.

# Sustainable Technology and Sustainable Development

Technology plays an important role in accomplishing sustainable development goals by delivering new solutions to global issues such as poverty, climate change, and social injustice.

→ Technology is an essential tool for striking a balance among economic growth, social welfare, and environmental sustainability.

Sustainable technology is defined as technology developed or deployed in accordance with environmental, social, and economic considerations.

# AI leverages technology solutions to optimize routes to sustainable development.



Artificial Intelligence (AI) is the ability of machines to **perform tasks** that usually require human intelligence.



A branch of computer science that focuses on the creation of systems or machines capable of executing tasks that would ordinarily need human intellect. These tasks include learning, thinking, problem solving, perception, and natural language comprehension.



AI is everywhere, helping us in daily tasks and providing valuable insights.



Its use in apps and devices means more efficiency, creativity, and smarter solutions for various challenges we face every day.

# Artificial Intelligence Opportunities



## Fintech

AI enhances **digital transactions** and banking services.



## Agriculture

Smart farming uses **technology** for better yields.



## Industry

Automation improves **production efficiency** and safety.



## Transportation

AI optimizes routes and enhances **traffic management**.

# Artificial Intelligence Opportunities



## E-commerce

**AI enhances** online shopping experiences and recommendations.



## Health

**AI improves** patient care and diagnostic accuracy.



## Logistics

**AI streamlines** shipping and delivery processes efficiently.

# The Use of AI in the Indonesian Economy

## Financial Technology (Fintech)

AI is used in credit risk assessment, fraud detection, and innovative financial solutions.



**Kredivo**

Kredivo uses AI in its user data-driven creditworthiness analysis.



**Akulaku**

AI-based fintech startup that provides P2P lending services

## Agriculture

AI is utilized in crop monitoring with drones and agricultural data analysis.



**eFishery**

eFishery uses AI in automated fish feed management, improving the efficiency of fishery farming.

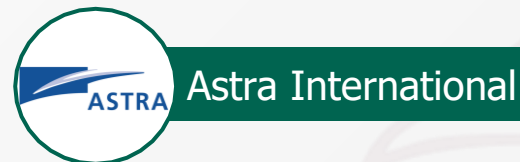
## Manufacturing and Industry

Application of intelligent robotics and AI to improve production efficiency.



**Pitik**

Using AI and IoT to improve the efficiency of the poultry industry's supply chain.



**Astra International**

Using AI in automated production systems and predictive maintenance in its factories.

## Transportation

AI is applied in traffic management and prediction of transportation needs.



**Gojek**

using AI for travel route optimization and on-demand transportation services.

# AI Implementation

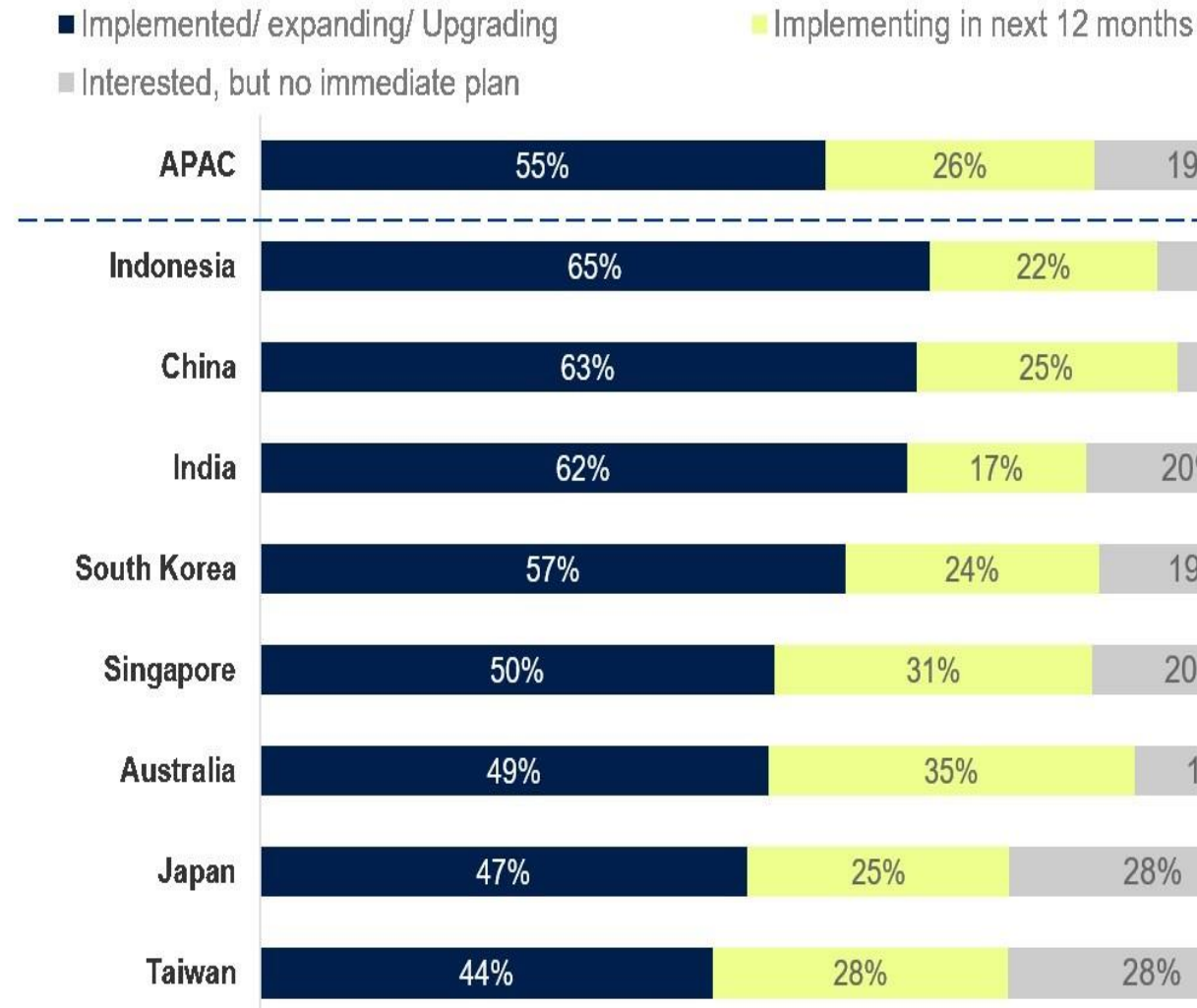
**Indonesia leads with 65% of organizations that have implemented or expanded AI.**

Taiwan shows the lowest percentage at 44%, with most still planning to implement in the next 12 months (28%).

China, India, and South Korea are also relatively advanced, with the percentage of current AI implementation above 60%.

Singapore, Australia, Japan show a more balanced approach, with a large number planning to implement AI in the future.

## The stages of AI implementation in different markets



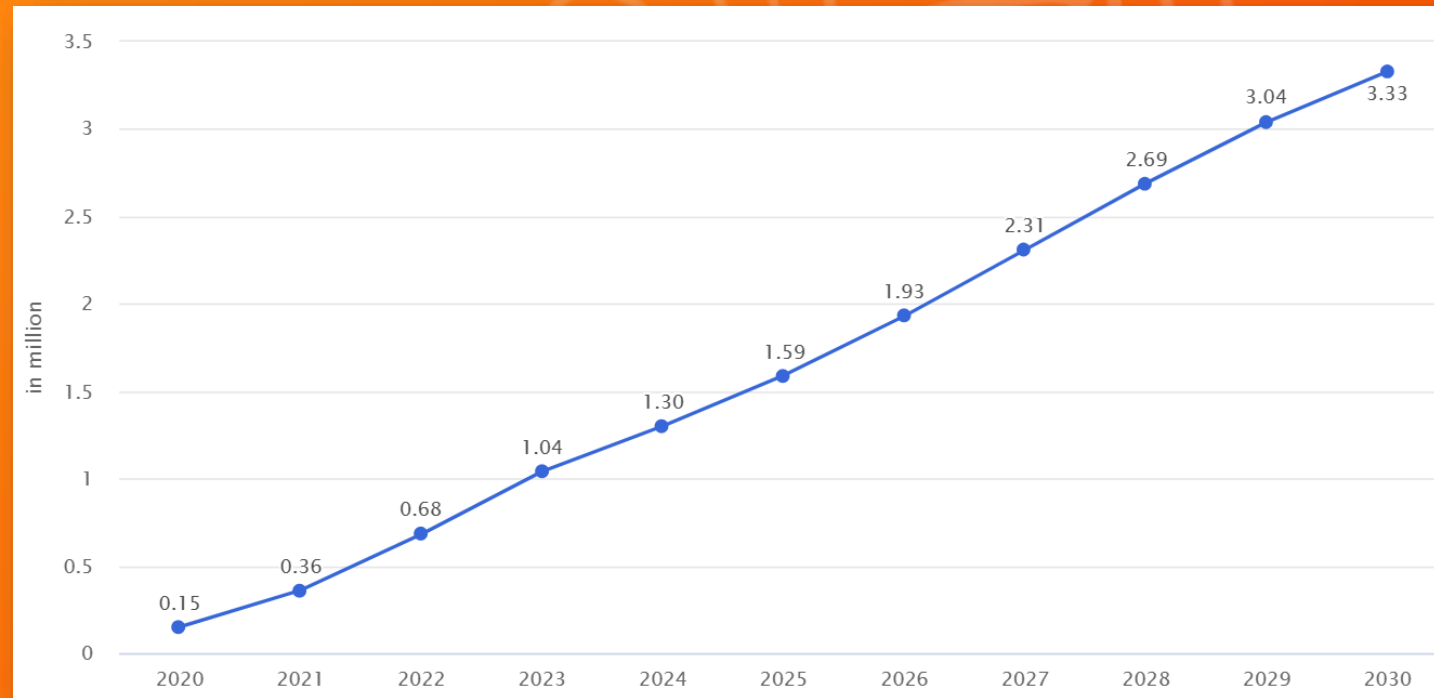
## Significant Growth

- 2020: 0.15 million users
- 2023: 1.04 million users
- Prediction 2030: 3.33 million users
- Stable Growth Rate

## Average increase: 20–30% per year

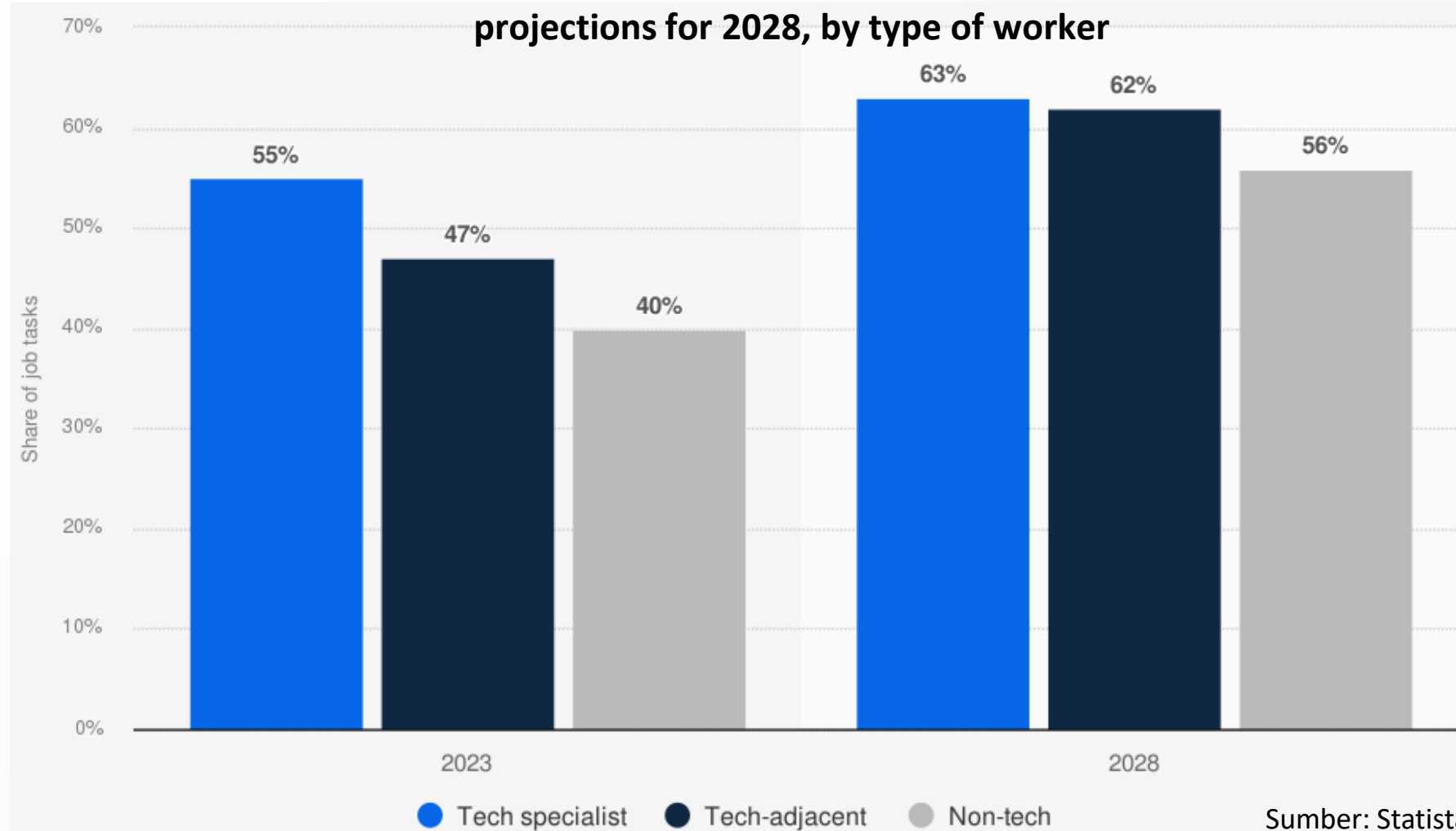
- 2024: 1.30 million users
- 2025: 1.93 million users
- A Great Leap in the Future
- Prediction 2030: 3.33 million users
- An increase of more than three times compared to 2024.

# AI Users in Indonesia



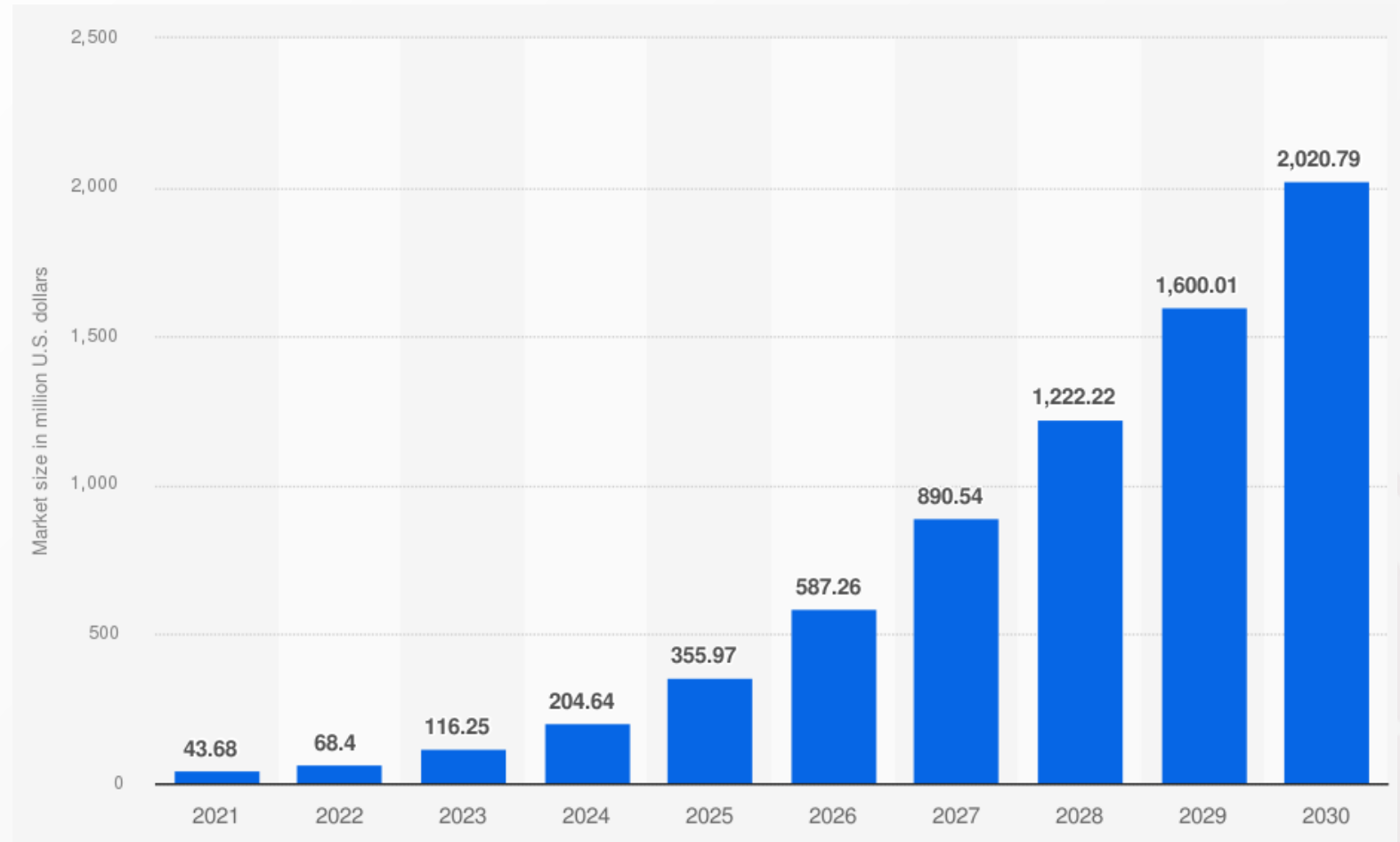
Statista (2025).

## Estimated portion of job tasks performed with AI-powered solutions and tools in Indonesia in November 2023 with projections for 2028, by type of worker



In 2023, the work done with AI-based solutions and tools in Indonesia showed the highest proportion in tech specialist workers (55%), followed by technology-related workers (47%) and non-tech workers (40%). By 2028, it is predicted that the proportion of jobs using AI will increase, with technology specialists estimated at 63%, tech-related workers 62%, and non-tech workers 56%. This shows the adoption of AI is increasingly widespread in different types of jobs, especially in sectors that are more related to technology.

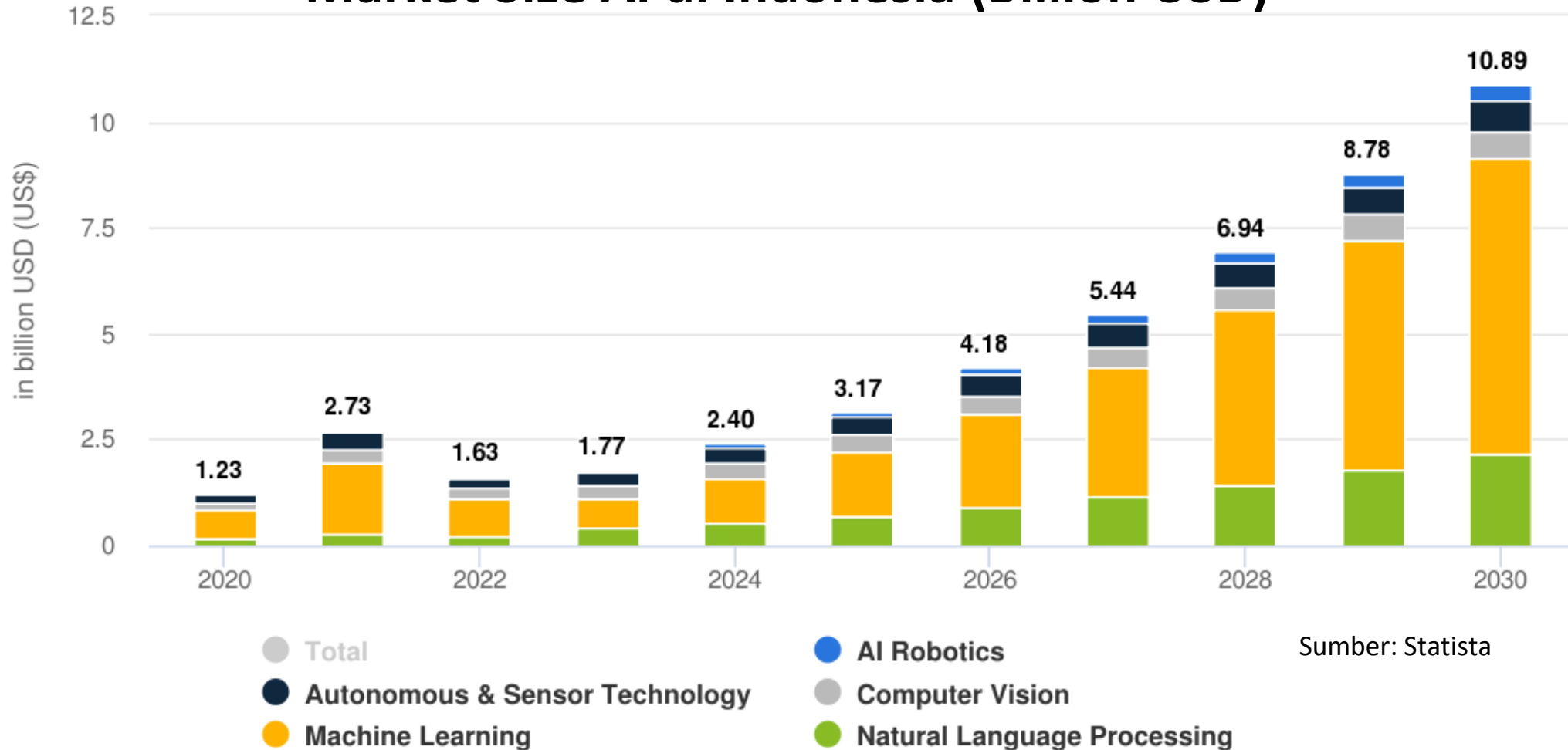
## Market size of generative artificial intelligence (GenAI) in Indonesia from 2021 to 2030 (in million U.S. dollars)



Sumber: Statista

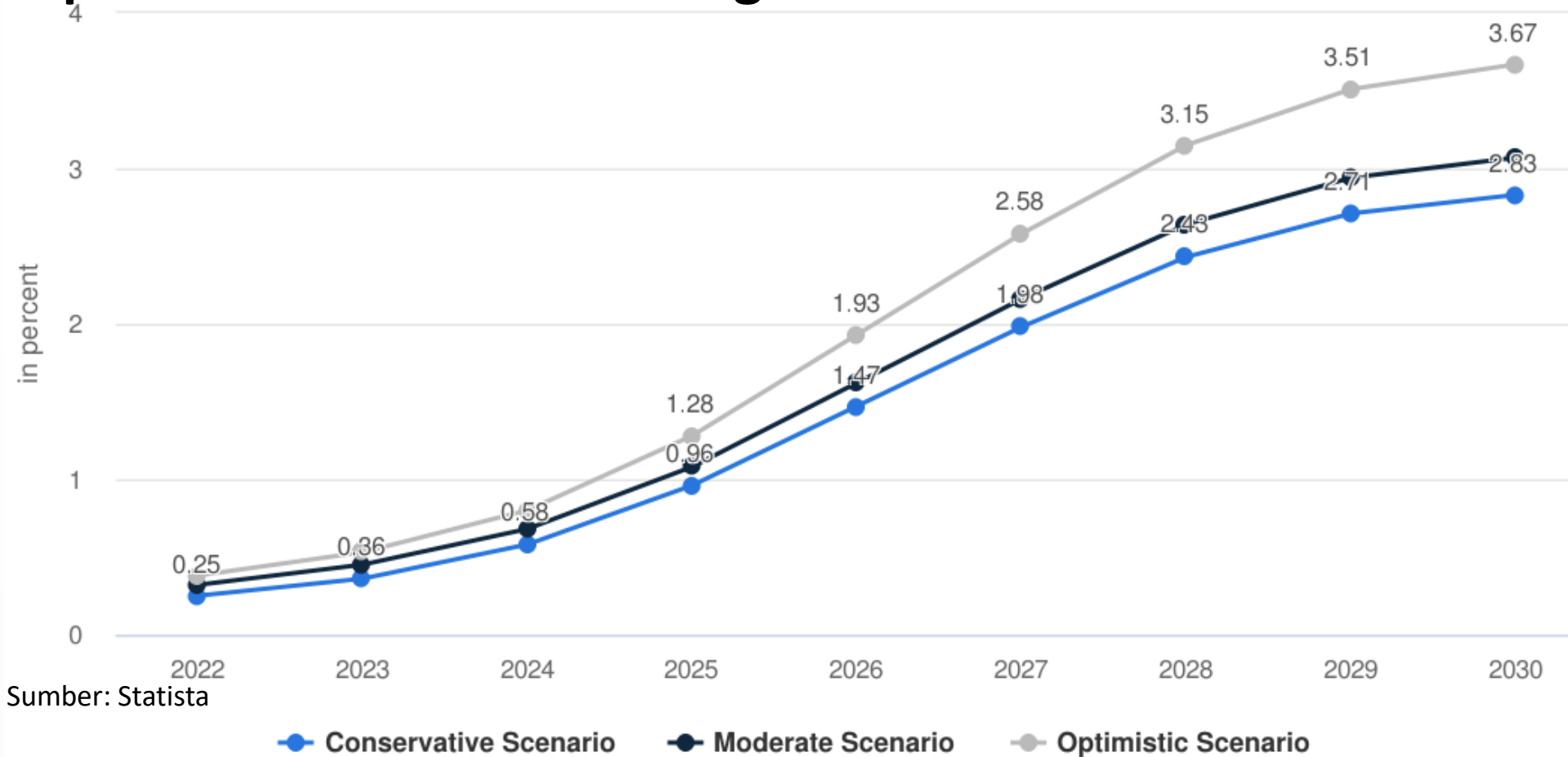
The market size of generative artificial intelligence (GenAI) in Indonesia shows rapid growth from 43.68 million USD in 2021 to 2,020.79 million USD in 2030. This growth is expected to continue to accelerate, with a significant surge starting to be seen in 2026 (587.26 million USD) and peaking in 2030. This reflects the increasing adoption and increasing use of AI technology in various sectors in Indonesia.

# Market Size AI di Indonesia (Billion USD)



The size of the artificial intelligence (AI) market in Indonesia shows a significant growth trend from 1.23 billion USD in 2020 to 10.89 billion USD in 2030. This increase is mainly driven by the Machine Learning segment, which continues to dominate the market. By 2028, the sector is expected to reach 6.94 billion USD. In addition, the AI Robotics and Natural Language Processing sectors have also experienced significant increases, reflecting the widespread adoption of AI technology across various industries.

# Impact of The Artificial Intelligence Market on Indonesia's GDP

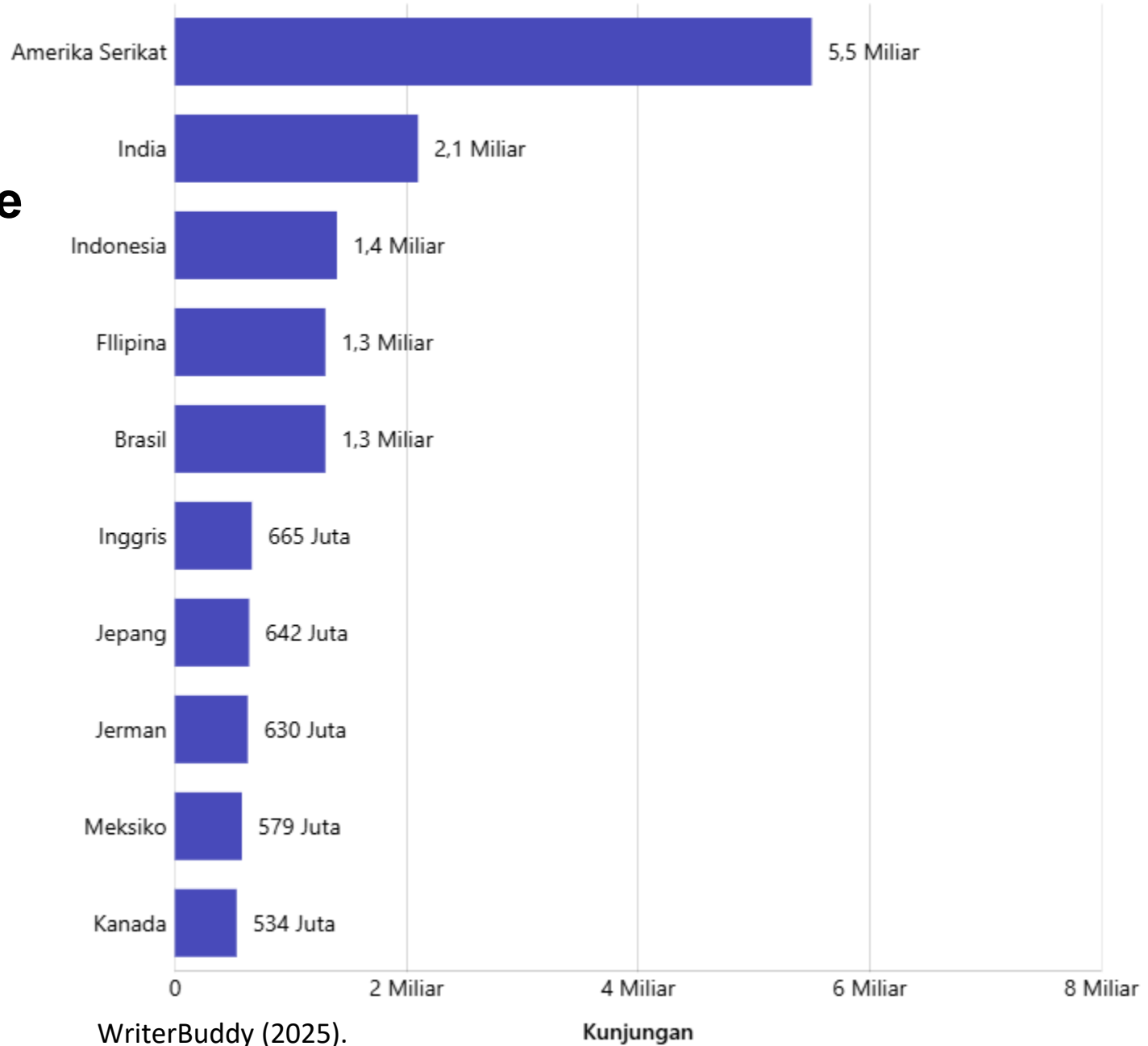


The Impact Of The Artificial Intelligence (AI) Market On Indonesia's GDP Shows A Significant Increase From 0.25% In 2022, With A Projection Of Reaching 2.63% In 2030 In A Conservative Scenario. In A Moderate Scenario, The Impact Of AI Is Expected To Reach 2.71%, While In An Optimistic Scenario, The Impact Can Reach 3.67%. This Suggests That AI Adoption Can Make An Increasingly Significant Contribution To Indonesia's Economic Growth As Technology Develops And Wider AI Implementation.

## Indonesia is the 3rd most visited application for artificial intelligence in the world →

According to a report from WriterBuddy, Indonesian internet users generated 1.4 billion visits to AI applications from September 2022 to August 2023.

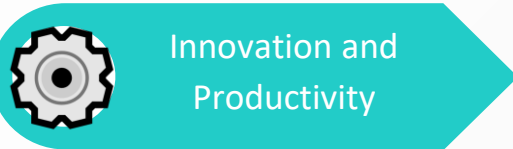
This figure accounts for 5.60% of total global traffic, **placing Indonesia in third place.**



Technology enhances efficiency in the industrial, agricultural, and service sectors producing greater output with fewer resources



*Example:* Smart farming in East Java and Kalimantan uses IoT sensors to monitor oil palm and rice fields.

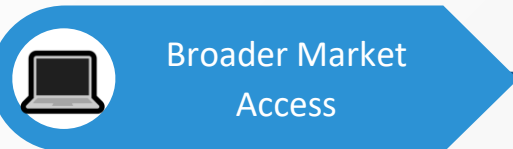


New industries are emerging in renewable energy, waste management, and digital infrastructure.



*Example:* The Cirata Solar Power Plant project

## The Role of Technology in Promoting Sustainable Development: Economic Growth



Digital platforms expand the reach of MSMEs and farmers to global markets through e-commerce and fintech solutions.



*Example:* Tokopedia, GoTo, and eFishery enable digital supply chains and micro-financing access.

IoT and AI technologies support efficient and sustainable smart cities.



*Example:* Jakarta's MRT & LRT systems use digital ticketing and low-emission energy monitoring technologies.

E-learning platforms and digital classrooms make quality education accessible even in remote areas.

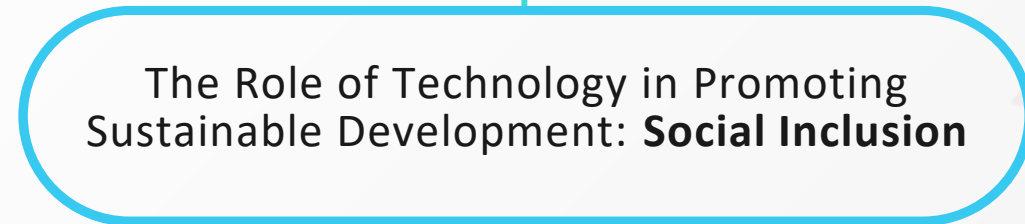


*Example:* **Ruang Guru** and **Zenius** provide affordable online learning for millions of Indonesian students, especially during and after the pandemic.

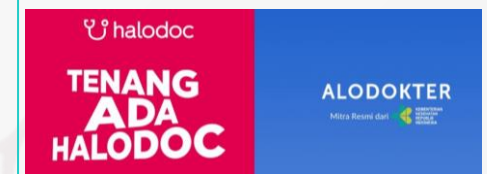
Technology opens new opportunities for women and marginalized groups to engage in the economy and entrepreneurship.



*Example:* Women-led SMEs empowered through **Tokopedia** and **GoFood Partners**, and digital skills training by **Google Indonesia's Women Will** program.



Telemedicine, health apps, and AI-based diagnostics expand medical access and enable early disease detection.



*Example:* **Halodoc** and **Alodokter** connect patients to doctors online and deliver prescriptions nationwide.

Digital governance systems enhance accountability, reduce corruption, and strengthen public trust.



*Example:* **Online Single Submission (OSS)** improve transparency in public service and business licensing.

1

## Renewable Energy Technologies

Technological innovation in solar, wind, and hydro energy reduces reliance on fossil fuels, helping to cut greenhouse gas emissions and slow climate change.



*Example (Indonesia):* The “**Sumba Iconic Island**” program in **East Nusa Tenggara (NTT)** has installed **solar power plants (PLTS)** that bring renewable electricity to rural communities previously dependent on diesel generators. This initiative supports both decarbonization and rural electrification.

2

## Energy Efficiency

Smart grids, digital metering, and automated building systems allow better energy monitoring and control, minimizing waste and optimizing consumption.

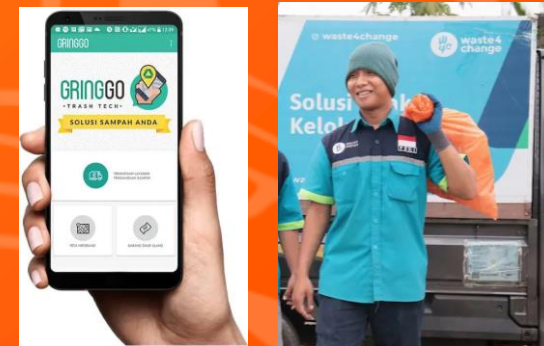


*Example (Indonesia):* **Jakarta Smart City** integrates energy-efficient technologies across public infrastructure and government buildings. Smart street lighting and real-time monitoring systems have reduced power usage and operational costs.

3

## Waste Reduction & Circular Economy

Recycling, waste-to-energy conversion, and circular economy models promote efficient resource use and minimize pollution. Technology also enables tracking and accountability in waste management systems.



*Example (Indonesia):* **Waste4Change** and **Gringgo Indonesia Foundation** employ digital platforms and AI-based data mapping to improve waste collection, recycling, and plastic credit trading, reducing plastic pollution and supporting sustainable production cycles.

# Comparison of AI Usage in Indonesia, Asia, and Global

Aspects	Indonesia	ASIA	Global (OECD & Developing Countries)
Investing in AI	US\$ 23 million (higher than the Philippines, Singapore, Thailand, Malaysia, Vietnam)	Southeast Asia: US\$ 11 million - US\$ 4 million	OECD: The average is higher, reaching US\$ 3-4 billion for developed countries.
Number of AI Startups	Leading startups: Kata.ai, Akulaku, Pitik	More startups with more funding in countries like China, Japan, and India	Developed countries like the US and Europe have thousands of AI startups with hundreds of millions of dollars in funding
The Use of AI in the Economic Sector	Finance, E-commerce, Manufacturing, Agriculture, Health, Education	The same main sector, but with more mature adoption in countries like Japan, China	Developed countries are leveraging AI in all key sectors, with faster innovation in high-tech and manufacturing industries
AI Adoption in the Government Sector	AI is used for public services and administration	Countries like Singapore and China have implemented AI in broader public policy	In developed countries, AI for government policies and smart cities is growing rapidly with major use in the judiciary, health, and transportation systems

# Challenges:

1

**Algorithmic bias and data privacy concerns.**

2

The disparity in **technology access** among islands remains a significant barrier.

3

Significant upfront expenses and suitable supporting infrastructure.

4

There is also a possibility that new technologies will **have new societal consequences.**

Consequently, inclusive governmental policies, investments in education and human ability, and cross-sector collaboration are required to drive sustainable development and ensure that all sectors of society benefit from technological innovations.

**Thank you.**

