

# SILICON VALLEY INDONESIA

## EKOSISTEM KEMAJUAN DAN KEBARUAN INDONESIA

Disampaikan untuk Studium General  
Prodi S1 Teknik Komputer – Fakultas Teknik Elektro  
Telkom University  
26 Februari 2021

**Budiman Sudjatmiko, M.Sc., M.Phil.**

**Ketua Umum Inovator 4.0 Indonesia**

Ketua Dewan Pengawas Koperasi Satelit Desa Indonesia (KSDI)

Ketua Dewan Pengawas Koperasi Energi Nusantara Desa Indonesia (KENDI)

Ketua Dewan Pengawas Koperasi Industri Kreatif Indonesia (KIKI)



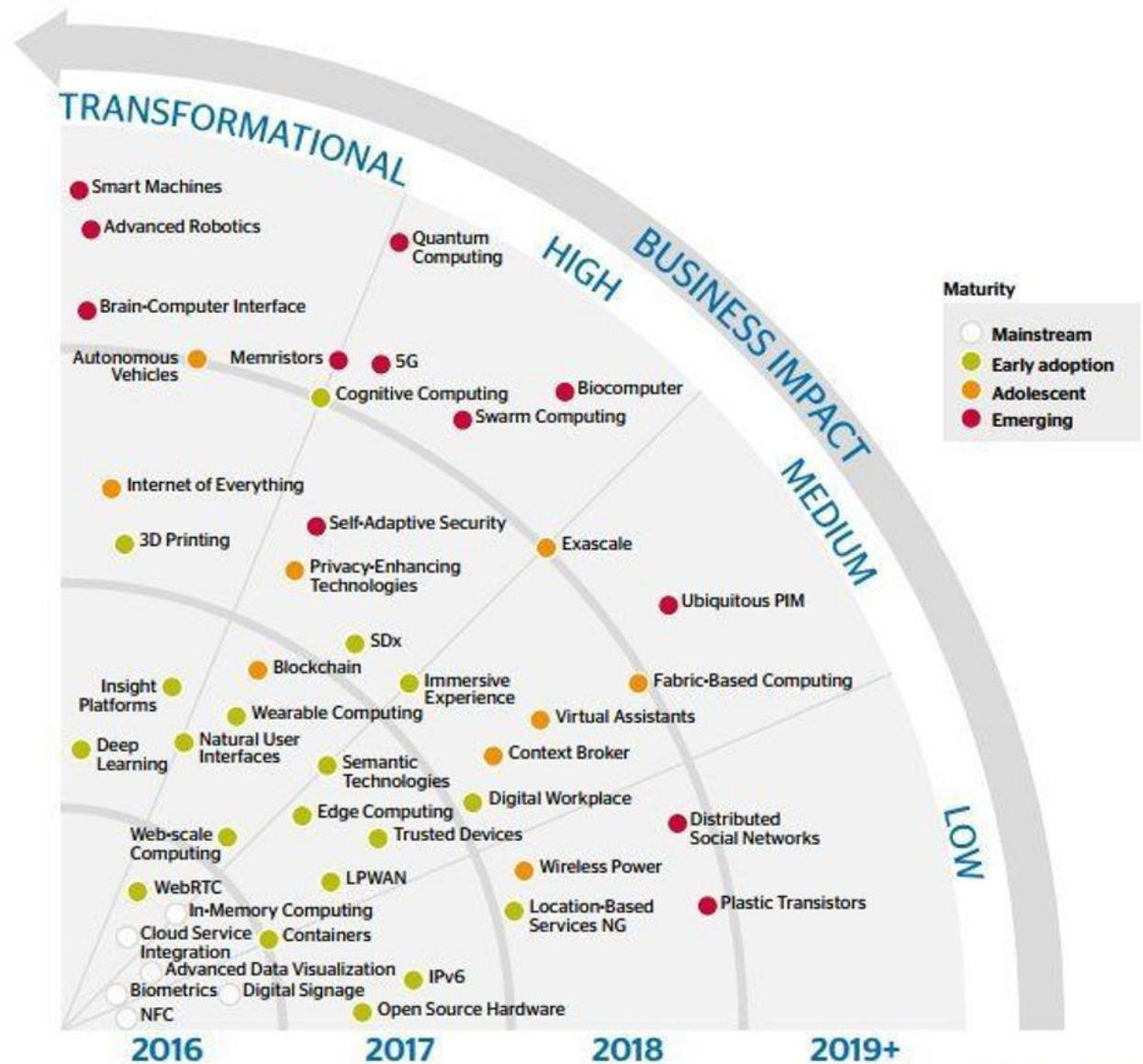
# INOVATOR 4.0 INDONESIA – Menjemput Momentum Masa Depan



# ARE YOU READY?

# ?

# Technologies that will Impact your Business & Society



# KATEGORI INOVASI DAN REKAYASA TEKNOLOGI



## REKAYASA ATOMIK

1. Wireless Power
2. Plastic Transistors
3. Nanotechnology

## REKAYASA KOMPUTASI

1. Quantum Computing
2. Cognitive Computing
3. Blockchain
4. Edge Computing
5. Advanced Data Visualization
6. Deep Learning
7. 5G
8. IPv6

## REKAYASA BIOLOGICAL

1. Genetics Engineering
2. Lab-Grown Food Technology

1. Smart Machines
2. Advanced Robotics
3. Immersive Experience
4. Internet of Everything

1. 3D Printing
2. Autonomous Vehicles
3. Swarm Computing
4. Memristors
5. Wearable Computing

1. Biocomputer
2. In-Memory Computing
3. Natural User Interface
4. Brain-Computer Interface
5. Privacy-Enhancing Technology

1. Nano-bio Technology
2. Biometrics

# PREDIKSI PERKEMBANGAN TEKNOLOGI DAN DAMPAK SOSIAL BUDAYA



2025

2030

2035

2040

2045

1. *Wealth Distribution & Assets Decentralization Economic Model* akan semakin matang berkat teknologi digital.

1. Disrupsi Sistem Pendidikan dan Dunia Kerja. Standar gelar dan keahlian berkurang relevansinya.

1. *Computasi Quantum* mendefinisikan ulang ruang-waktu dan mendorong Revolusi Kesadaran.

1. Perubahan Geopolitik yang drastis dipicu oleh Eksplorasi Ruang Angkasa yang berhasil mencapai planet lain.

1. Indonesia 100 Tahun akan tetap relevan dan berpengaruh jika selalu memperkuat basis sejarah dan budayanya.

2. Revolusi Sistem dan Budaya Pangan berbasis Lokalitas untuk mengurangi *Carbon Footprint*.

2. Sumber Energi semakin Modular dan Otonom. Energi terbarukan semakin matang berkat penemuan material-material baru.

2. *Immersive Experience* menghasilkan Realita Semu dan mengganggu tatanan sosial budaya.

2. Kesenjangan sosial tidak lagi semata-mata berbasis ekonomi, tetapi berbasis imajinasi, ruang dan waktu.

2. Indonesia 100 Tahun akan menjadi negara *Melting Pot* terakhir, sehingga keanekaragaman budaya menjadi *Hegemonic Driver*.

3. Revolusi Layanan Kesehatan berbasis *Digital Surveillance* menantang Konsep *Privacy*.

3. Personalisasi Proses Produksi berkat teknologi 3D Printing yang semakin matang dan efisien.

3. Disrupsi Sistem Politik menjadi semakin sederhana dan dinamis, berkat teknologi *Digital, Blockchain* dan *Big Data*.

3. Standar baru kemajuan negara tidak lagi hanya mengacu pada ukuran ekonomi, tapi juga psikologi dan sosiologi.

3. *Soft Power* Indonesia akan semakin dibutuhkan dunia untuk menjaga harmoni dalam tatanan masyarakat dunia yang semakin singular.

# Inovator 4.0 Indonesia Activity Domain

INOVATOR 4.0 ID

AS

**MOVEMENTS**

*(inspirasi dan aksi)*

- Public Opinion Management
- Social Media Campaign
- Literacy & Inclusion Program

INOVATOR 4.0 ID

AS

**IDEA EXCHANGE  
PLATFORM**

*(ide dan kolaborasi)*

- Capacity Building Program
- Sharing Session
- Collaborative Projects

INOVATOR 4.0 ID

AS

**INDONESIA  
SOCIOTECHNOPRENEUR**

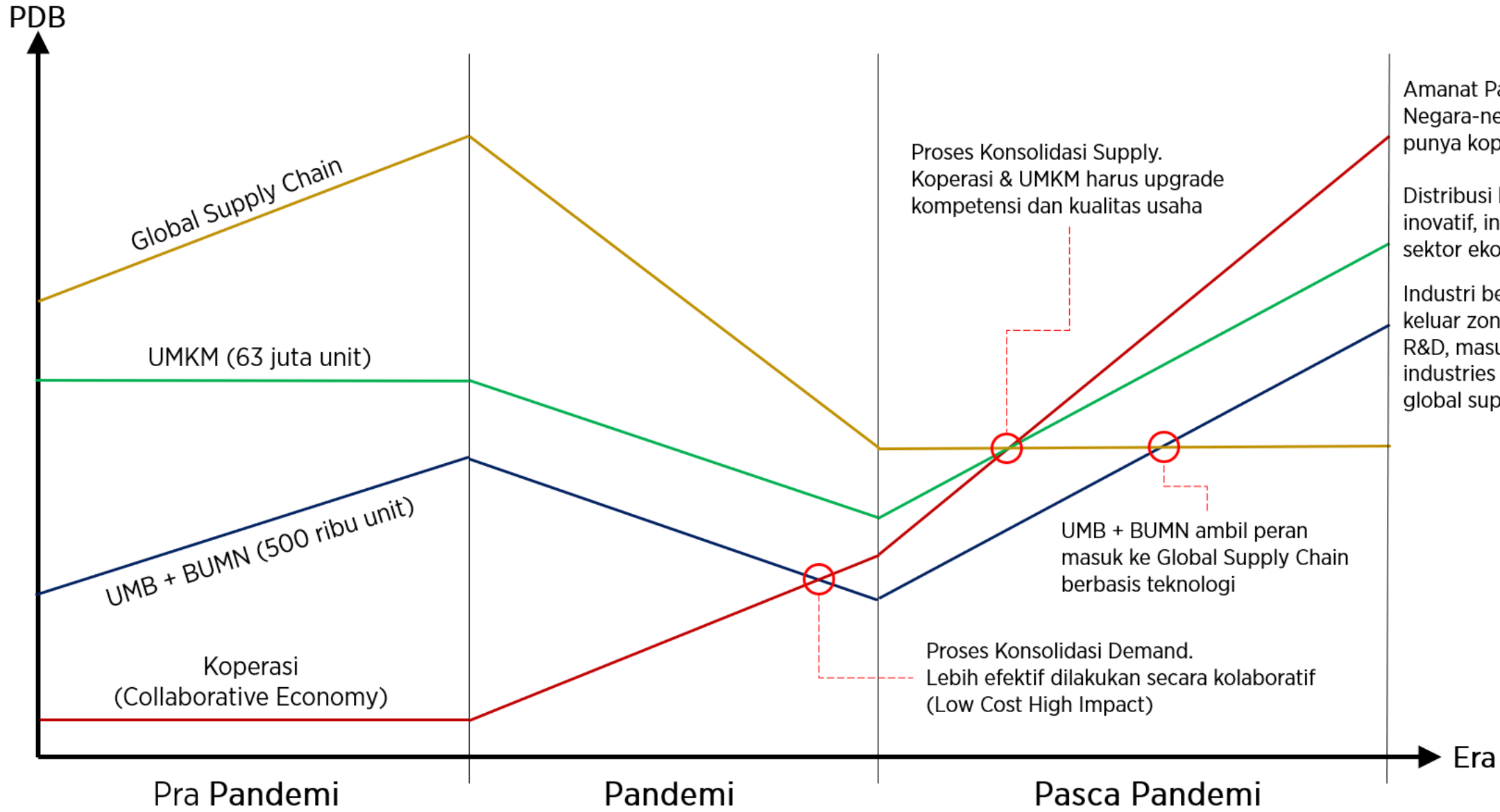
*(kolektivitas dan produktivitas)*

- Cooperative Nation
- Village-Based Value Added
- Business Partnership

# SILICON VALLEY INDONESIA – Ekosistem Kemajuan & Kebaruan Indonesia



# SILICON VALLEY INDONESIA BAGIAN DARI STRATEGI EKONOMI INDONESIA PASCA PANDEMI



Amanat Pasal 33 UUD 1945. Negara-negara besar selalu punya koperasi tingkat dunia.

Distribusi kue ekonomi lebih inovatif, inklusif dan berbasis sektor ekonomi riil.

Industri besar harus berani keluar zona nyaman. Bangun R&D, masuk sektor advanced industries dan terlibat dalam global supply chain.



ANGGARAN RISET - PER NEGARA (Tahun Bervariasi, 2015 - 2018)



		Kurs 1 Dollar	Rp	14.500		
No.	Negara	GDP (Juta Dollar) IMF 2018	GDP (Rupiah)	R&D (%) World Bank	R&D (Rupiah)	Lahir
0	Dunia	\$ 79.865.481	Rp 1.158.049.474.500.000.000		Rp -	
1	Amerika Serikat	\$ 20.412.870	Rp 295.986.615.000.000.000	2,74%	Rp 8.110.033.251.000.000	
2	Uni Eropa	\$ 19.669.743	Rp 285.211.273.500.000.000	2,03%	Rp 5.789.788.852.050.000	
3	Tiongkok	\$ 14.092.514	Rp 204.341.453.000.000.000	2,11%	Rp 4.311.604.658.300.000	1949
4	Jepang	\$ 5.167.051	Rp 74.922.239.500.000.000	3,14%	Rp 2.352.558.320.300.000	
5	Jerman	\$ 4.211.635	Rp 61.068.707.500.000.000	2,94%	Rp 1.795.420.000.500.000	
6	Britania Raya	\$ 2.936.286	Rp 42.576.147.000.000.000	1,69%	Rp 719.536.884.300.000	
7	Prancis	\$ 2.925.096	Rp 42.413.892.000.000.000	2,25%	Rp 954.312.570.000.000	
8	<b>India</b>	<b>\$ 2.848.231</b>	<b>Rp 41.299.349.500.000.000</b>	<b>0,62%</b>	<b>Rp 256.055.966.900.000</b>	<b>1947</b>
9	Italia	\$ 2.181.970	Rp 31.638.565.000.000.000	1,29%	Rp 408.137.488.500.000	
10	Brasil	\$ 2.138.918	Rp 31.014.311.000.000.000	1,27%	Rp 393.881.749.700.000	
11	Kanada	\$ 1.798.512	Rp 26.078.424.000.000.000	1,53%	Rp 398.999.887.200.000	
12	Rusia	\$ 1.719.000	Rp 24.925.500.000.000.000	1,10%	Rp 274.180.500.000.000	
13	<b>Korea Selatan</b>	<b>\$ 1.693.246</b>	<b>Rp 24.552.067.000.000.000</b>	<b>4,23%</b>	<b>Rp 1.038.552.434.100.000</b>	<b>1945</b>
14	Spanyol	\$ 1.506.439	Rp 21.843.365.500.000.000	1,19%	Rp 259.936.049.450.000	
15	Australia	\$ 1.500.256	Rp 21.753.712.000.000.000	1,92%	Rp 417.671.270.400.000	
16	Meksiko	\$ 1.212.831	Rp 17.586.049.500.000.000	0,49%	Rp 86.171.642.550.000	
17	<b>Indonesia</b>	<b>\$ 1.074.966</b>	<b>Rp 15.587.007.000.000.000</b>	<b>0,15%</b>	<b>Rp 23.380.510.500.000</b>	<b>1945</b>
18	Belanda	\$ 945.327	Rp 13.707.241.500.000.000	2,03%	Rp 278.257.002.450.000	
19	<b>Turki</b>	<b>\$ 909.885</b>	<b>Rp 13.193.332.500.000.000</b>	<b>0,88%</b>	<b>Rp 116.101.326.000.000</b>	<b>1923</b>
20	Arab Saudi	\$ 748.003	Rp 10.846.043.500.000.000	0,82%	Rp 88.937.556.700.000	
21	Swiss	\$ 741.688	Rp 10.754.476.000.000.000	3,37%	Rp 362.425.841.200.000	
22	Argentina	\$ 625.921	Rp 9.075.854.500.000.000	0,53%	Rp 48.102.028.850.000	
23	Polandia	\$ 614.190	Rp 8.905.755.000.000.000	0,97%	Rp 86.385.823.500.000	
24	Taiwan	\$ 613.295	Rp 8.892.777.500.000.000	2,35%	Rp 208.980.271.250.000	
25	Swedia	\$ 600.771	Rp 8.711.179.500.000.000	3,25%	Rp 283.113.333.750.000	
26	Belgia	\$ 562.229	Rp 8.152.320.500.000.000	2,49%	Rp 202.992.780.450.000	
27	<b>Thailand</b>	<b>\$ 483.739</b>	<b>Rp 7.014.215.500.000.000</b>	<b>0,78%</b>	<b>Rp 54.710.880.900.000</b>	
28	Austria	\$ 477.672	Rp 6.926.244.000.000.000	3,09%	Rp 214.020.939.600.000	
29	Norwegia	\$ 443.252	Rp 6.427.154.000.000.000	2,03%	Rp 130.471.226.200.000	
30	Iran	\$ 418.875	Rp 6.073.687.500.000.000	0,25%	Rp 15.184.218.750.000	
31	Uni Emirat Arab	\$ 411.827	Rp 5.971.491.500.000.000	0,96%	Rp 57.326.318.400.000	
32	Nigeria	\$ 408.612	Rp 5.924.874.000.000.000	0,22%	Rp 13.034.722.800.000	
33	Irlandia	\$ 385.142	Rp 5.584.559.000.000.000	1,18%	Rp 65.897.796.200.000	
34	<b>Israel</b>	<b>\$ 373.751</b>	<b>Rp 5.419.389.500.000.000</b>	<b>4,25%</b>	<b>Rp 230.324.053.750.000</b>	
35	Afrika Selatan	\$ 370.887	Rp 5.377.861.500.000.000	0,80%	Rp 43.022.892.000.000	
36	Denmark	\$ 369.760	Rp 5.361.520.000.000.000	2,87%	Rp 153.875.624.000.000	
37	<b>Malaysia</b>	<b>\$ 364.919</b>	<b>Rp 5.291.325.500.000.000</b>	<b>1,30%</b>	<b>Rp 68.787.231.500.000</b>	<b>1957</b>
38	Hong Kong	\$ 364.782	Rp 5.289.339.000.000.000	0,80%	Rp 42.314.712.000.000	
39	<b>Singapura</b>	<b>\$ 332.449</b>	<b>Rp 4.820.510.500.000.000</b>	<b>2,16%</b>	<b>Rp 104.123.026.800.000</b>	<b>1965</b>
40	Kolombia	\$ 327.978	Rp 4.755.681.000.000.000	0,24%	Rp 11.413.634.400.000	

SILICON VALLEY INDONESIA

Mendorong Indonesia

MENUJU KNOWLEDGE-BASED  
ECONOMY UNTUK MENGHINDARI  
MIDDLE-INCOME TRAP NATION

# GROUP I – 1 Candi (STEAM Enabler Center)

STEAM : Science Technology Engineering Art Mathematics





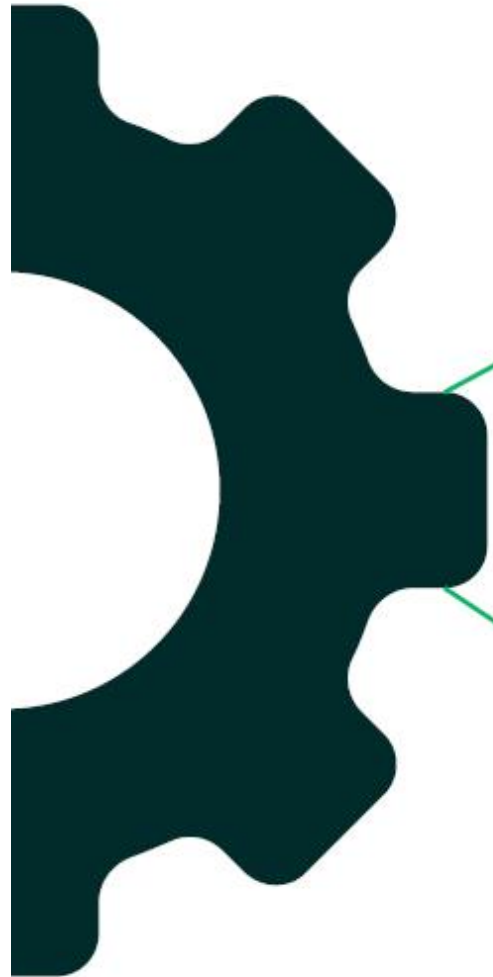
# Silicon Valley (Village) Indonesia – Kawasan Multikultural Berwawasan Masa Depan





# KEK Sukabumi juga diproyeksikan untuk mengakomodir industri berbasis teknologi 4.0, disokong dengan kemitraan institusi yang relevan

Terdapat dua kategori besar dalam industri berbasis teknologi



## *Technology-based industry*

Merupakan industri yang menjadikan teknologi sebagai fokus pertambahan nilai guna dan kompetensi utama



## *Technology-aided industry*

Merupakan industri konvensional yang dilengkapi faktor teknologi dalam upaya mencapai efisiensi, ramah lingkungan

### Mitra institusi potensial



*Teknologi Pertanian 4.0*



*Teknologi Kesehatan Presisi*



*Fusi Teknologi Canggih*

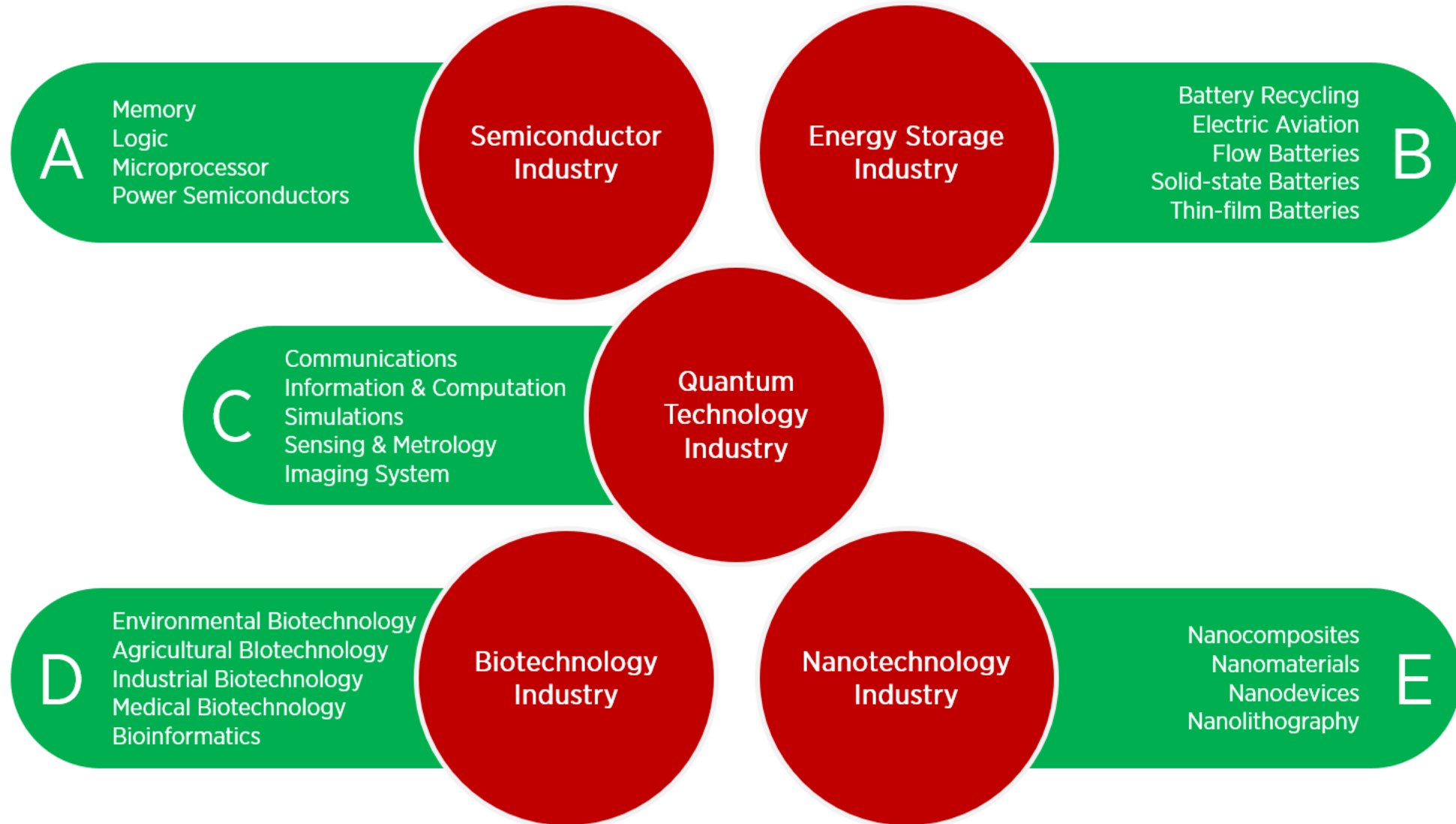
## GROUP II – 5 Menara (TRL Builder)

TRL : Technology Readiness Level, *Tingkat Kesiapan Teknologi untuk Membangun Ekonomi & Masuk Pasar*



- Sejak peluncuran pesawat N-250, sudah lama bendera merah putih tidak berkibar penuh kebanggaan atas keberhasilan kemajuan teknologi dan inovasi bangsa Indonesia di tingkat dunia.
- Sudah lama rakyat Indonesia tidak tersenyum dan bertepuk tangan bersama-sama atas keberhasilan kemajuan teknologi dan inovasi putra-putri Indonesia di tingkat dunia.
- Negara-negara maju membuktikan bahwa kemajuan teknologi dan inovasi bukan hak eksklusif sedikit negara saja, atau bahkan ras tertentu saja.
- Semua negara terbukti mampu mencapai kemajuan tersebut, termasuk negara berkembang. Bahkan diperkirakan setelah Pandemi Global Covid-19 usai, perlombaan kemajuan teknologi dan inovasi akan semakin cepat dan ketat.
- Kemajuan teknologi dan inovasi suatu negara harus dimulai dari kemauan yang kuat dari negara untuk kemudian membangun ekosistem kolaborasi teknologi dan inovasi antar komponen masyarakat yang efektif.

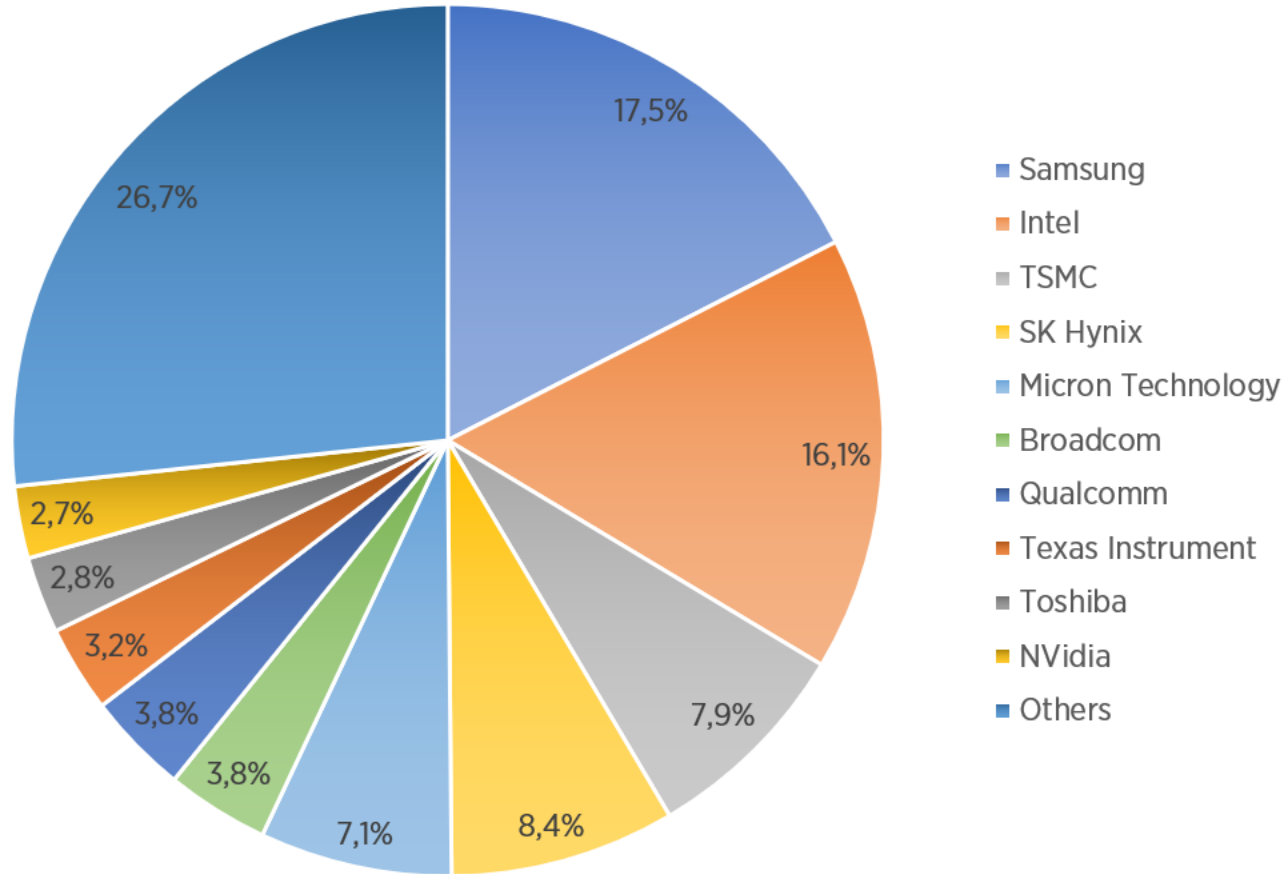
# Scope of Excellences



# A. Semiconductor Innovations

Global Market Value (2020)  
Compound Annual Growth Rate (CAGR)

: \$433 Billion  
: 9%



There is still a market share opportunity of 23.6%, including maintaining the domestic market

## Economic Impact

### A. Impact to Industrial Sectors :

1. Electronics
2. Energy & Utilities
3. Manufacturing
4. Telecommunications
5. Digital Economy
6. Others

### B. Impact to Economic Growth :

1. During 1987 to 2011, semiconductor industry's real contribution to U.S. GDP has grown annually by 5.5 percent, more than two times faster than GDP.
2. Measured in US dollars, China's semiconductor industry's reported revenues grew by 27% in 2007 to reach US\$27.4 billion.
3. Global GDP growth rate between 3.0 to 3.6 percent would translate into annual semiconductor growth of 5 to 9 percent.

### C. Impact to Job Creation :

1. In 2013, the U.S. semiconductor industry employed almost 250,000 workers directly and supports more than 1 million additional jobs throughout the broader U.S. economy.
2. The number of employees in China semiconductor industry increases 14.7 percent every year, jumping from 74,004 people in 2000 to 293,023 people in 2010.



# B. Energy Storage Innovations

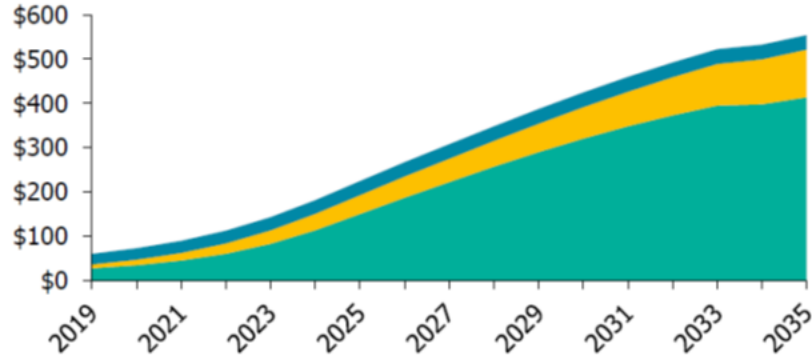
Global Market Value (2035)  
Compound Annual Growth Rate (CAGR)

: \$546 Billion  
: 14.9%

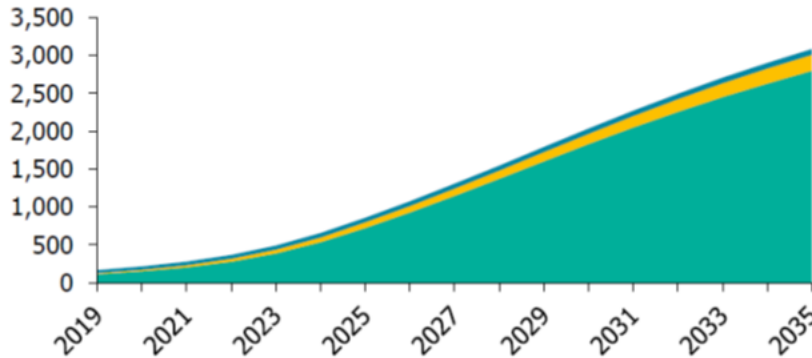


## Total market projections

Energy storage annual revenue (\$ billions)



Energy storage demand (GWh)



■ Mobility ■ Stationary storage ■ Electronic devices



## Top 10 Big Players :

- Samsung SDI
- Panasonic
- Toshiba
- LG Chem
- Tesla
- A123 Systems
- eCobalt Solutions
- BYD
- Contemporary Amperex Tech.
- Johnson Controls



## Economic Impact

### A. Impact to Industrial Sectors :

1. Electronics
2. Electricity
3. Telecommunications
4. Transportations
5. Automotives
6. Residentials
7. Others

### B. Impact to Economic Growth :

1. The cost of energy storage technologies has declined rapidly in past decade. This precipitous decline has made the economics of energy storage correspondingly more attractive to investors, grid operators, utilities and end-users.
2. The McKinsey Global Institute (MGI) identifies energy storage as one of the world's top 12 disruptive technologies. The consultancy estimates the potential global economic impact of improved energy storage could be as much as US\$635 billion a year by 2025.

### C. Impact to Job Creation :

1. In New York, energy storage industry is a significant economic opportunity for job growth and has the potential to support a total of 27,400 manufacturing and installation jobs by 2030.
2. 2.65 full-time equivalent (FTE) jobs are created from 1 million USD spending in fossil fuels, while that same amount of spending would create 7.49 or 7.72 FTE jobs in renewables or energy efficiency.

# C. Quantum Technology Innovations

Global Market Value (2035)

: \$18 Billion

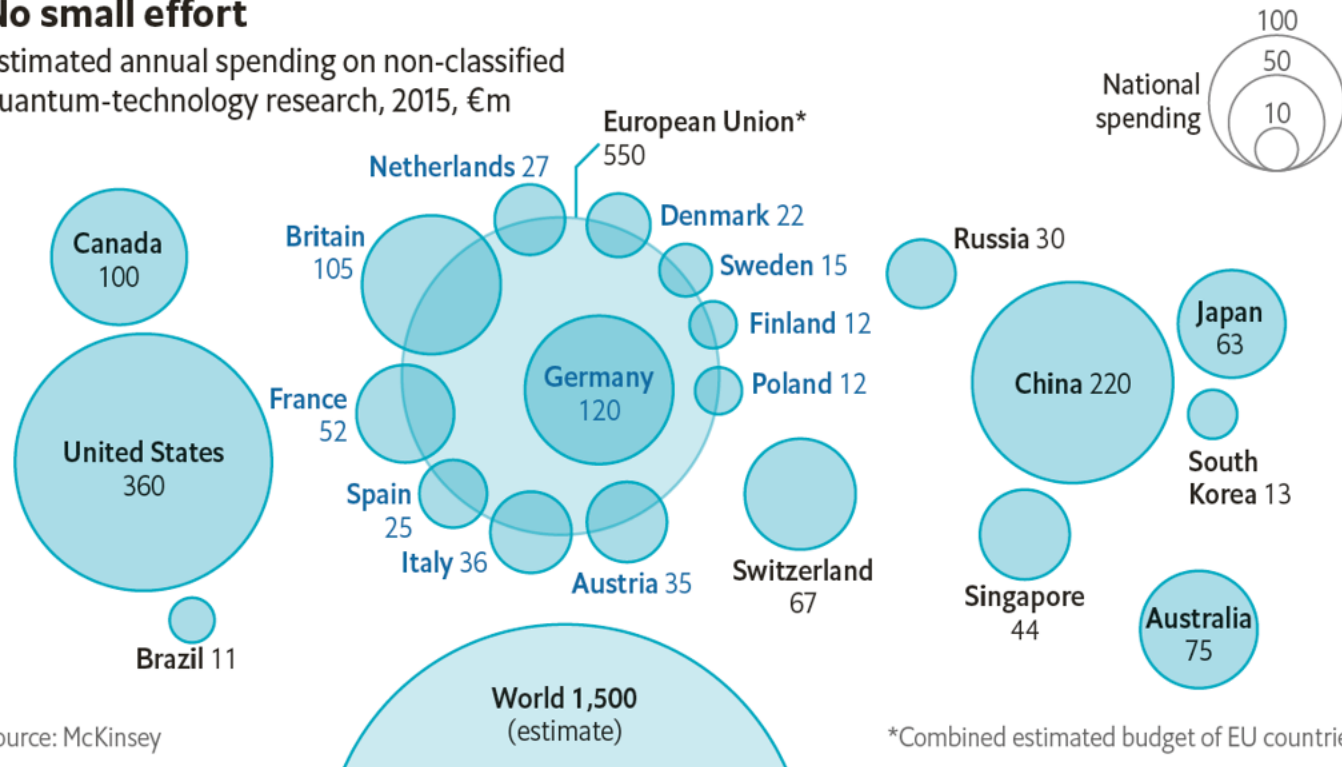
Compound Annual Growth Rate (CAGR)

: 32.5%



## No small effort

Estimated annual spending on non-classified quantum-technology research, 2015, €m



Source: McKinsey

\*Combined estimated budget of EU countries



## Economic Impact

### A. Impact to Industrial Sectors :

1. Healthcare & Life Sciences
2. Telecommunications
3. Manufacturing
4. Banking, Financial Services & Insurances (BFSI)
5. Energy & Utilities
6. Aerospace & Defense
7. Digital Economy
8. Others

### B. Impact to Economic Growth :

1. Canada plans by 2040, when quantum technology is expected to reach 50% adoption, it could grow into a \$142.4 billion industry, creating 229,000 jobs and generating \$55 billion in government returns.
2. Australia has a strong research base in quantum technology. With the right approach, this could become a A\$4 billion dollar industry for Australia by 2040 and create around 16,000 new, high-value jobs.

### C. Impact to Job Creation :

1. Quantum technology holds tremendous business opportunities and will benefit virtually every part of the economy.
2. Quantum technology's power to impact nearly every facet of society means that broad investment in the workforce is crucial.

## Top 10 Big Companies in Quantum Technology

- |              |                     |
|--------------|---------------------|
| 1. Google    | 6. NTT              |
| 2. Microsoft | 7. Honeywell        |
| 3. IBM       | 8. D-Wave Solutions |
| 4. Intel     | 9. Alibaba Quantum  |
| 5. Toshiba   | 10. Lockheed Martin |

# D. Biotechnology Innovations

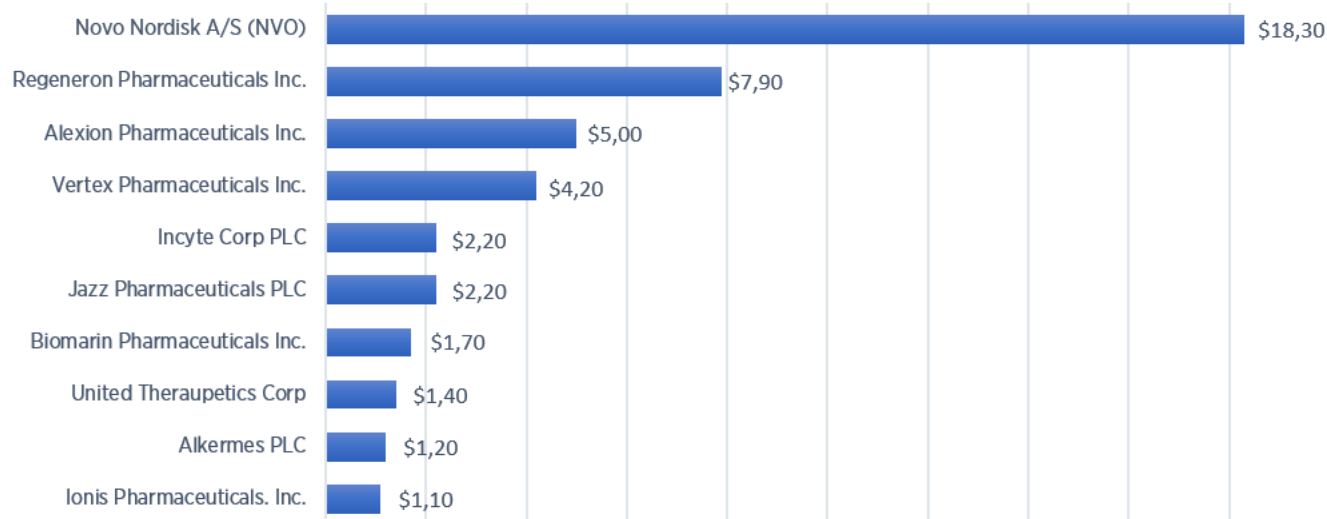
Global Market Value (2025)  
Compound Annual Growth Rate (CAGR)

: \$729 Billion  
: 8.3%

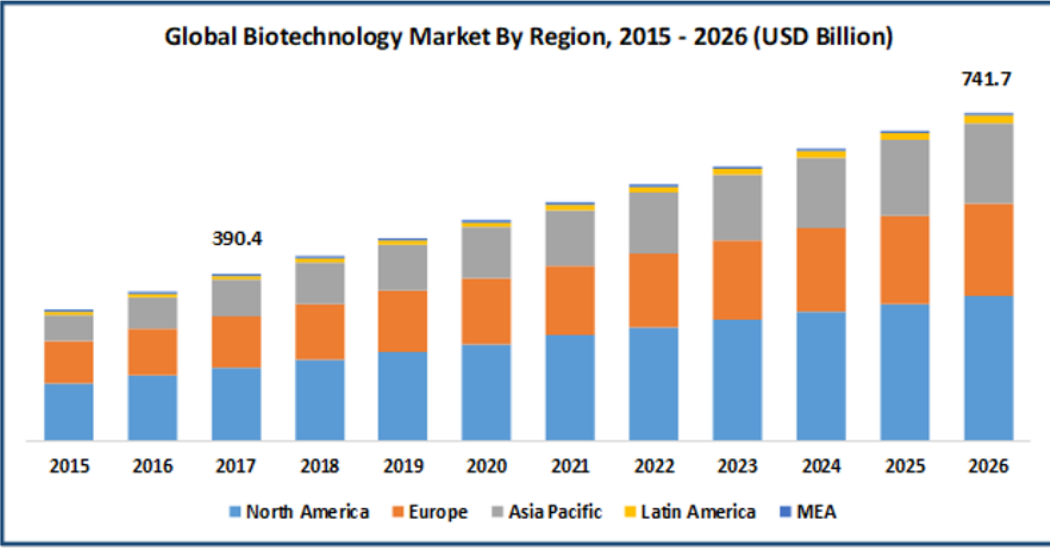


## The Top 10 Biotechnology Companies, 2020 (in \$ Billion)

<https://www.investopedia.com/articles/markets/122215/worlds-top-10-biotechnology-companies-inj-rogvx.asp>



## Global Biotechnology Market By Region, 2015 - 2026 (USD Billion)



## Economic Impact

### A. Impact to Industrial Sectors :

1. Health
2. Food & Agriculture
3. Natural Resources & Environment
4. Industrial Processing
5. Bioinformatics
6. Others

### B. Impact to Economic Growth :

1. Estimated 2017 in US, biotechnology industry revenues contributed at least \$388 Billion, or 2% of GDP. These revenues are B2B only, therefore an underestimate of the consumer level economic impact of industrial biotechnology by 10-30%.
2. The OECD predicted in 2009 that bio-based products would constitute at least 2.7 percent of GDP among the OECD member countries by 2030.

### C. Impact to Job Creation :

1. The European Commission estimates that the European bioeconomy (excluding health applications) already is worth more than €2 trillion annually and employs more than 21.5 million people.
2. According to Battelle's tally, US biotech alone accounted for a total of 1,605,533 jobs in 2010, with the sector adding an average of 9,600 new jobs each year over the past decade.

# E. Nanotechnology Innovations

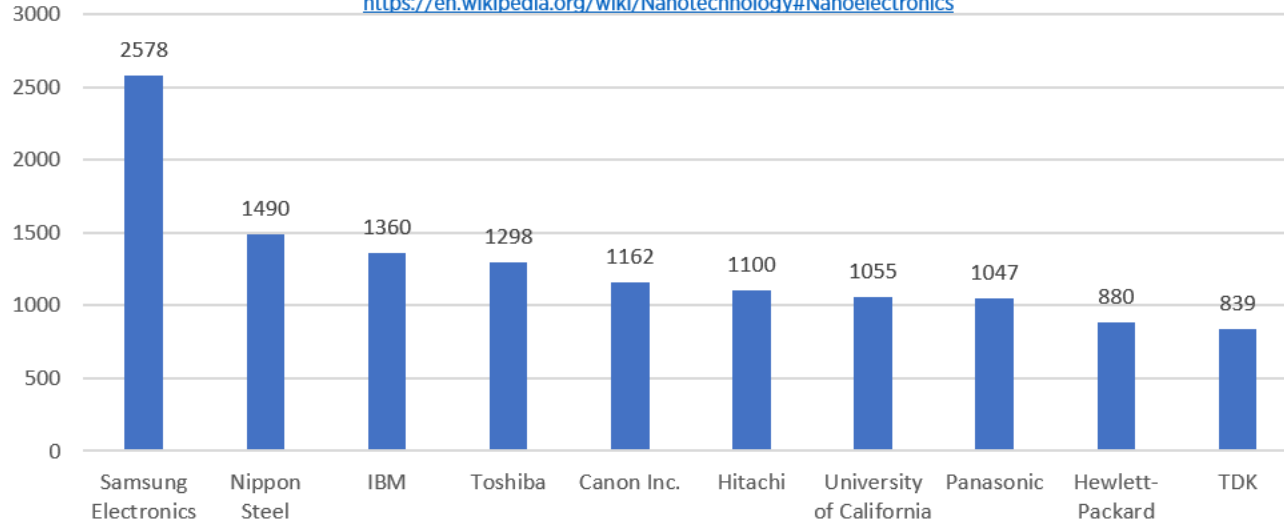
Global Market Value (2025)  
Compound Annual Growth Rate (CAGR)

: \$121,80 Billion  
: 10.40%



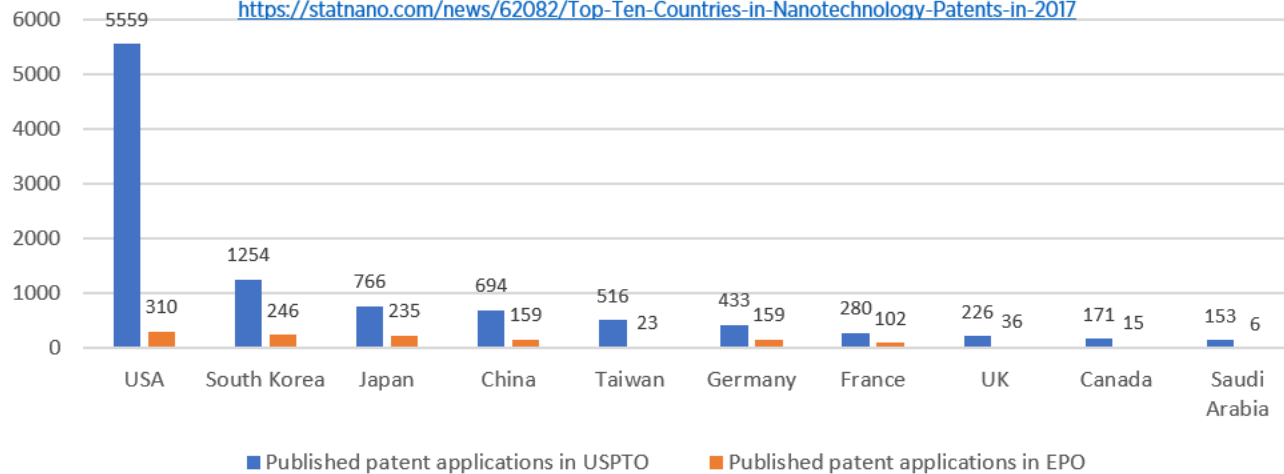
Top nanotechnology research organizations by patents (1970–2011)

<https://en.wikipedia.org/wiki/Nanotechnology#Nanoelectronics>



Top ten countries in the number of nanotechnology published patent applications in 2017

<https://statnano.com/news/62082/Top-Ten-Countries-in-Nanotechnology-Patents-in-2017>



## Economic Impact

### A. Impact to Industrial Sectors :

1. Electronics and Semiconductors
2. Healthcare
3. Manufacturing
4. Military
5. Food and Agriculture
6. IT & Telecommunications
7. Others

### B. Impact to Economic Growth :

1. Nanotechnology is a key element of advanced manufacturing, which is being pursued by a widening circle of industrial countries; Australia, Canada, China, France, Germany, Japan, South Korea and USA.
2. India launched the Nano Mission Project as a plan to become a 'global knowledge hub' in nanotechnology, launched within the *Eleventh Five-Year Plan* (2007–2012) as part of the government's strategy to maintain India's capacity for high-tech inventions.

### C. Impact to Job Creation :

1. Many large industries – such as energy, health and chemicals production and use – can be radically transformed by nanotechnology, while improving our lives through cleaner energy sources, personalized nanomedicine and nano-engineered materials.
2. Nanotechnology can also help millions to escape from the poverty trap by providing affordable health diagnoses, preventions and cures, and more targeted fertilizers and pesticides that act only when needed.



# Let's Collaborate!

Budiman Sudjatmiko, M.Sc., M.Phil.  
2021

