2020

SCIENCE OUTLOOK

Academy of Sciences Malaysia

#unlockingthefuture

CONDUCT OF STUDY

1000
Survey participants

2
Reviewers

96
Engagements

20
Publication & production members

14
Individual interviews

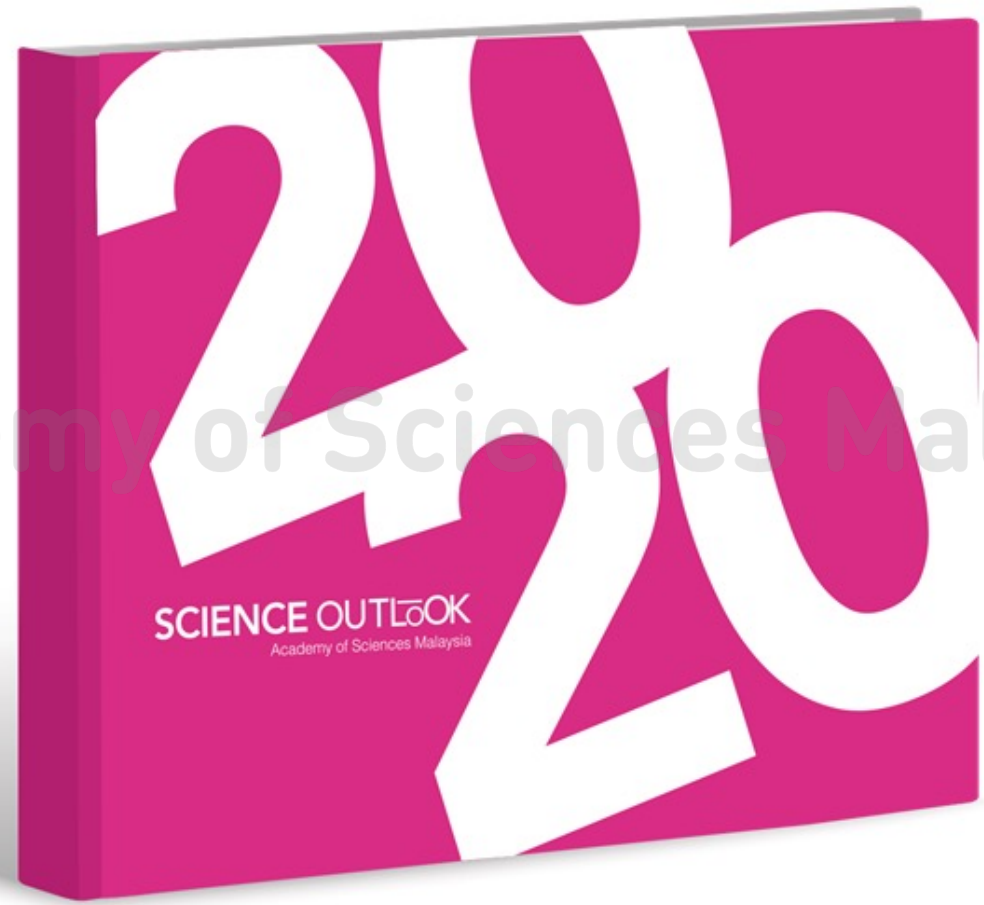
14
Analysts & researchers

600
References

26
Working Group Members

69
Data sources

5
Steering Committee Members



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Chairperson, Economic Impact Pillar
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26 Working Group Members

Team of 14 analysts and research assistants

Member of ASM's Science, Technology, Innovation Policy Advisory Committee (STIPAC)

CEO of ASM

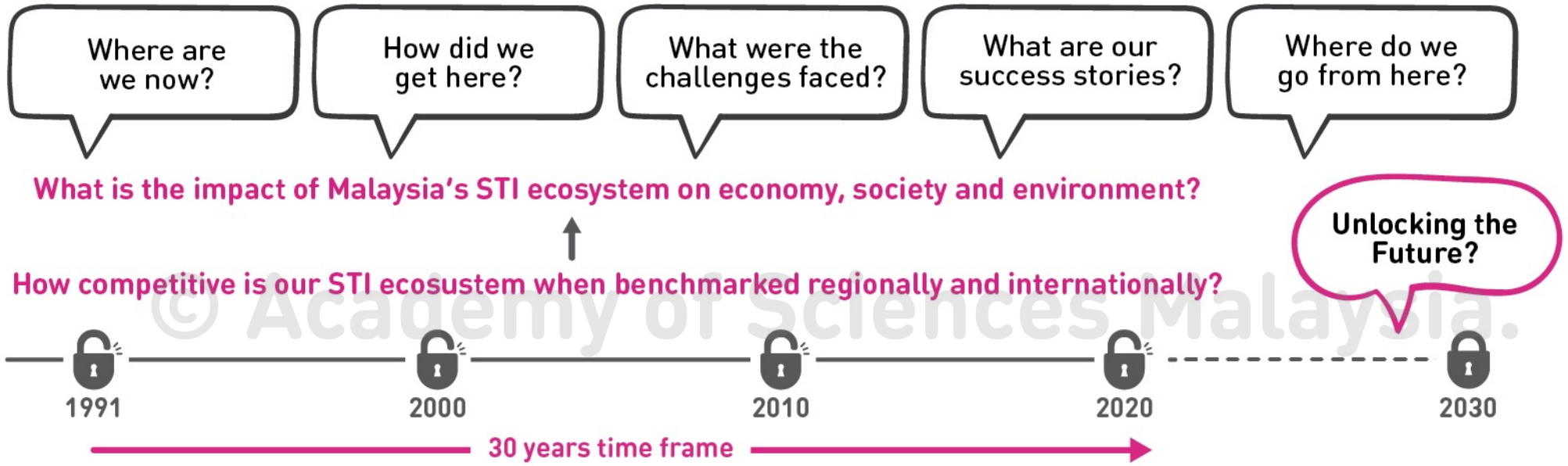
ASM Management

THE PHILOSOPHY OF SCIENCE OUTLOOK

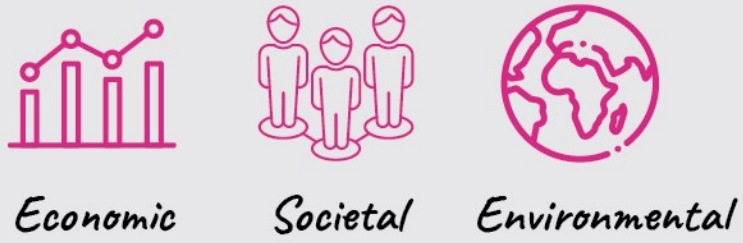
SCIENCE OUTLOOK An **independent review** of the STI landscape in Malaysia and the way forward

WHERE WE ARE IN STI?	GAPS	SCIENCE OUTLOOK
Stocktaking	Identify indicators	Way forward
Study key trends & challenges	Benchmarking	Towards evidence-based informed decision making
Data gathering	Evaluation	Future implications
	Analysis	Recommendations

SCIENCE OUTLOOK 2020: UNLOCKING THE FUTURE

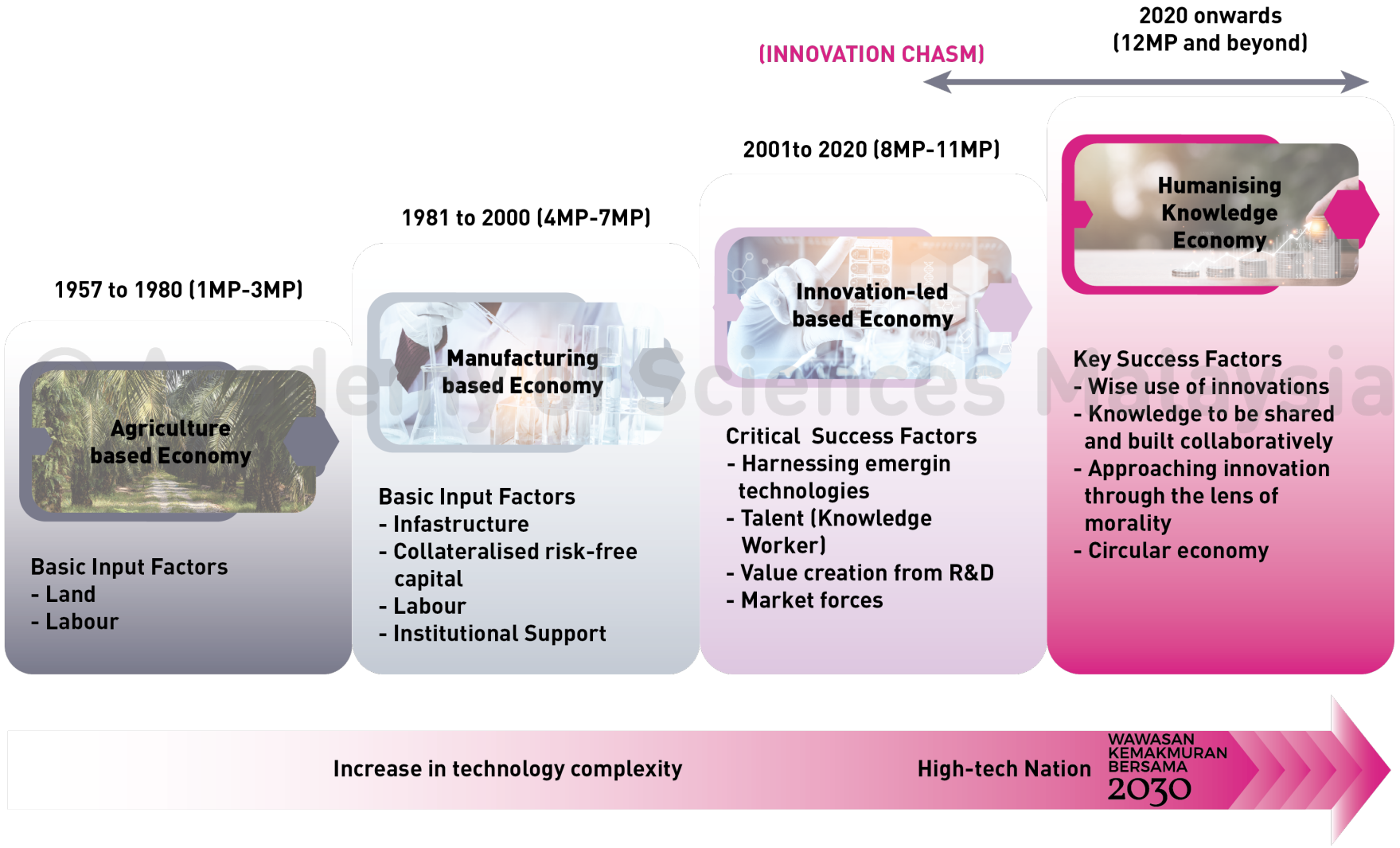


- Systemic review of the STI ecosystem
- Study STI impact on the three dimensions
- Recommendations to achieve aspirations of the Shared Prosperity Vision 2030



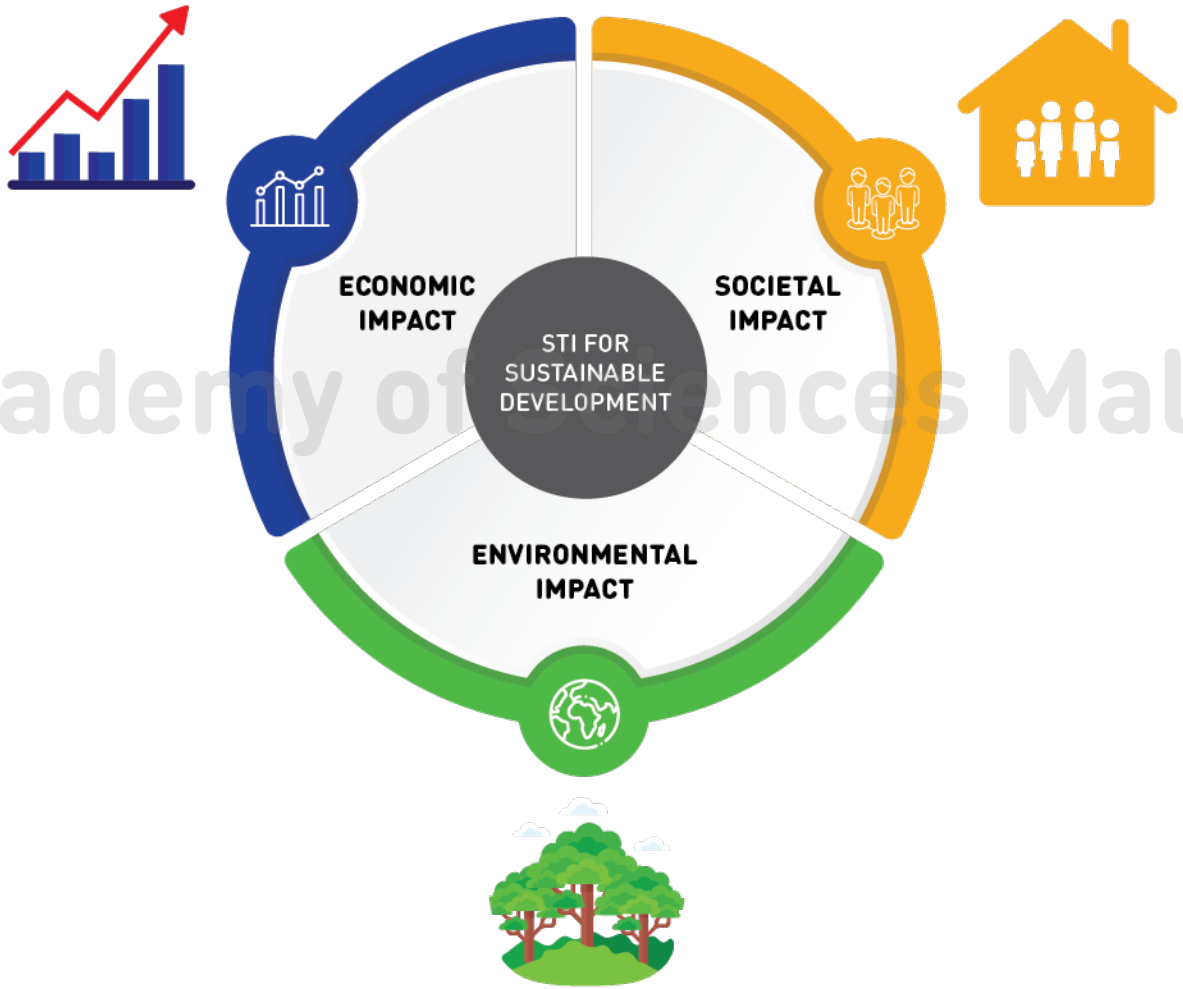
REALITY CHECK

MALAYSIA'S TRANSFORMATION



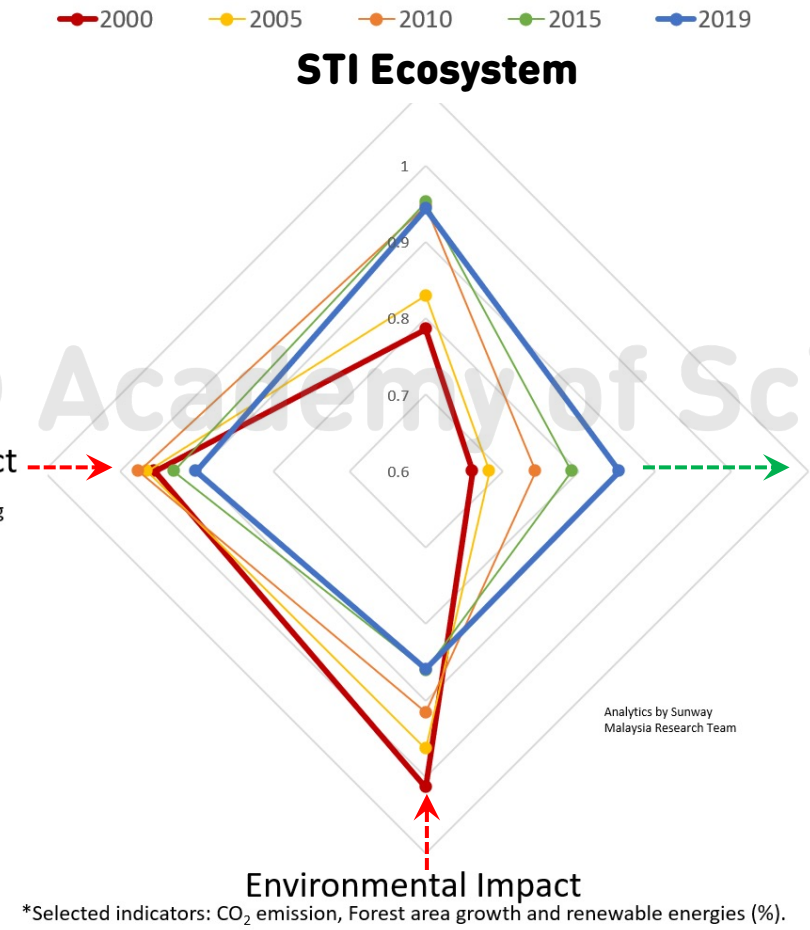
Reference: Adapted from S&T Foresight Malaysia 2050: Emerging Science, Engineering & Technology (ESET) Study (ASM, 2017)

STI FOR SUSTAINABLE DEVELOPMENT



OUR ANALYSIS

MALAYSIA'S DEVELOPMENT & ITS IMPACT



*For list of selected indicators in available in the full report

Analysed by Sunway University Research Team, 2021

Economy has had the most significant **growth** over the period (2000 - 2019)

The **social and environmental** aspects showed **decline** over the years.

KEY NATIONAL DEVELOPMENT POLICIES & PLANS

Rukunegara (1970)

New Economic Policy (NEP) (1971-1990)

Vision 2020 (1991-2020)

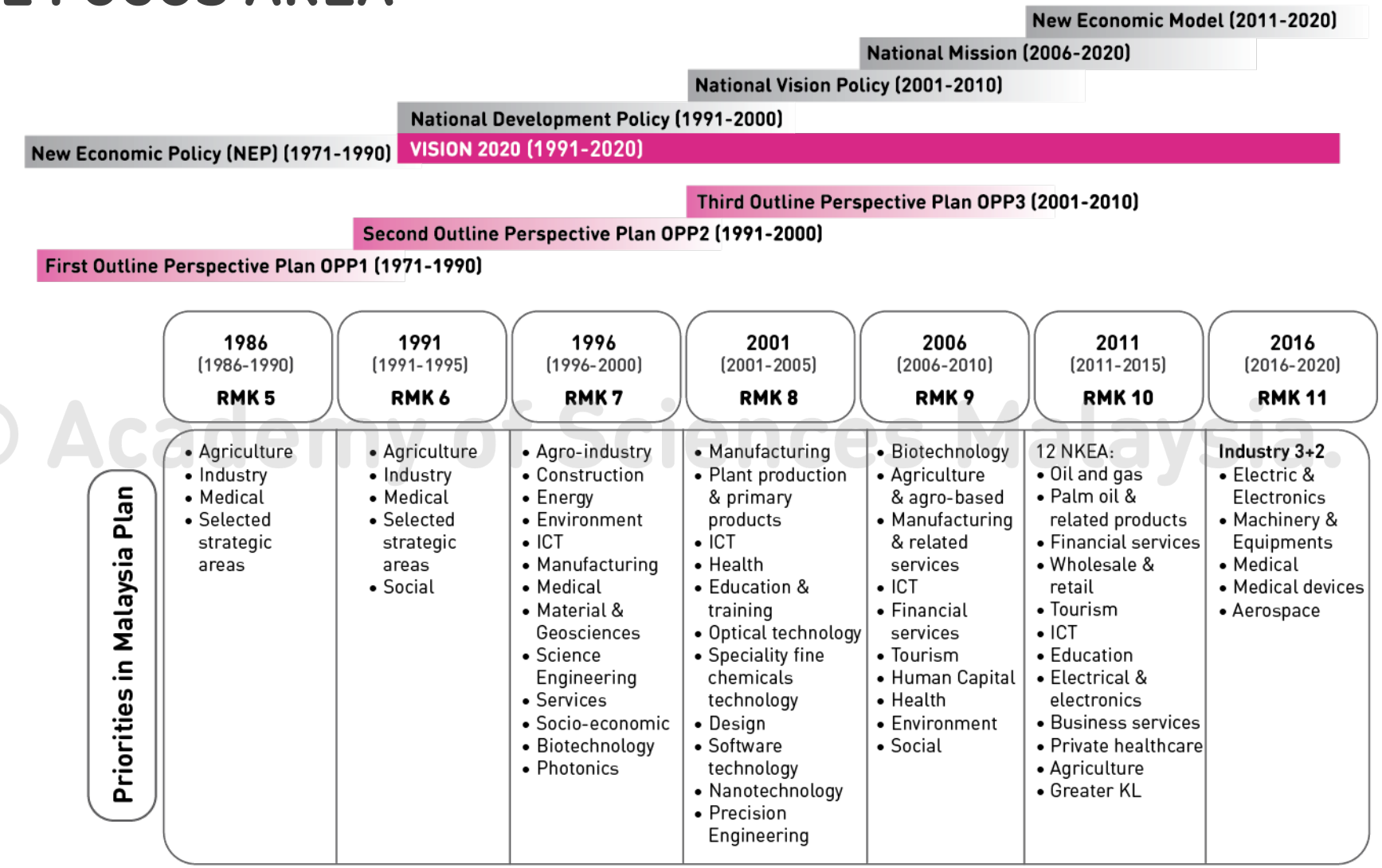
National Development Policy (1991-2000)

National Vision Policy (2001-2010)

New Economic Model (NEM) (2011-2020)

Shared Prosperity Vision (2021-2030)

NATIONAL FOCUS AREA

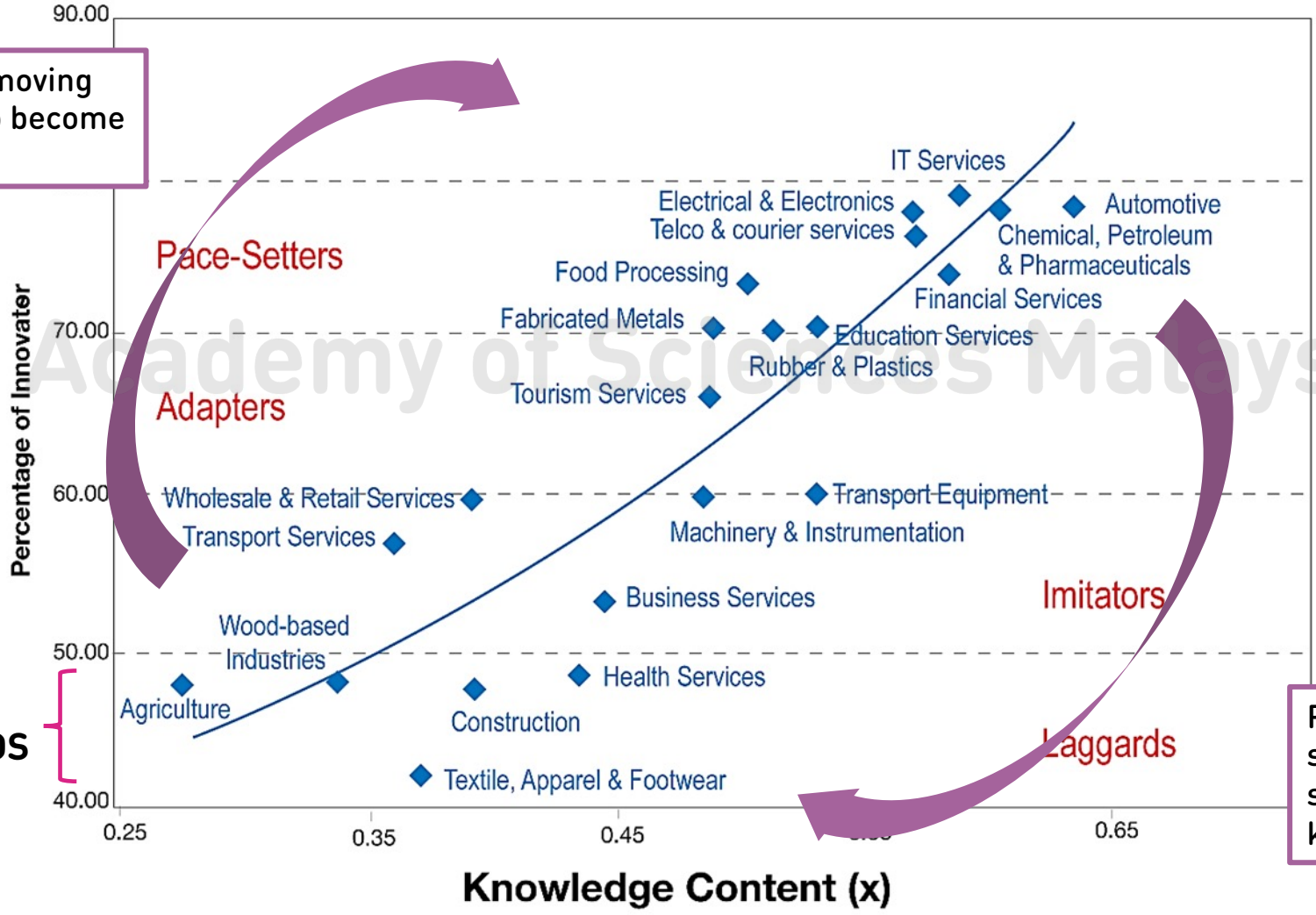


Did we have strategic focus?

Priority areas of economy & science was not common or aligned. STI was not linked to economy

MALAYSIA'S KEY ECONOMIC SECTORS & INNOVATION CAPACITY (Pockets of Excellence)

Laggard industries moving up the value chain to become pace-setters



BASIC NEEDS

Pace-setter industries should uplift the laggards by sharing technological knowledge and expertise

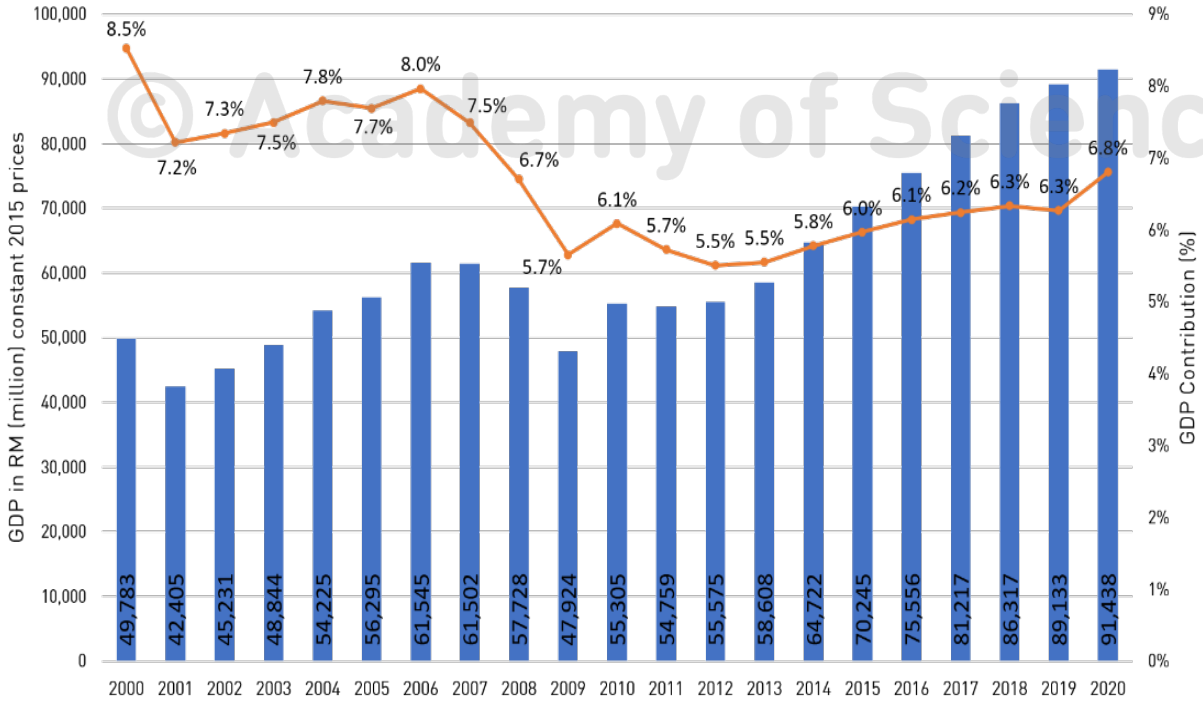
Reference: A Study on Knowledge Content in Key Economic Sectors in Malaysia Phase III (MyKE III), EPU 2016

CONTRIBUTION OF KEY SECTORS TO THE ECONOMY: MANUFACTURING (E&E)

GDP CONTRIBUTION OF MANUFACTURING SECTOR

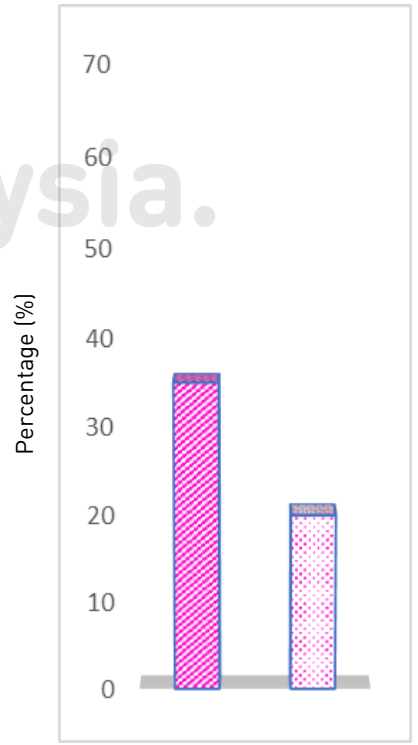
19% (1990) to 23% (2020)

MALAYSIA'S E&E INDUSTRY: GDP AND GDP CONTRIBUTION



Analysed by Sunway University Research Team, 2021

R&D IN THE E&E SECTOR



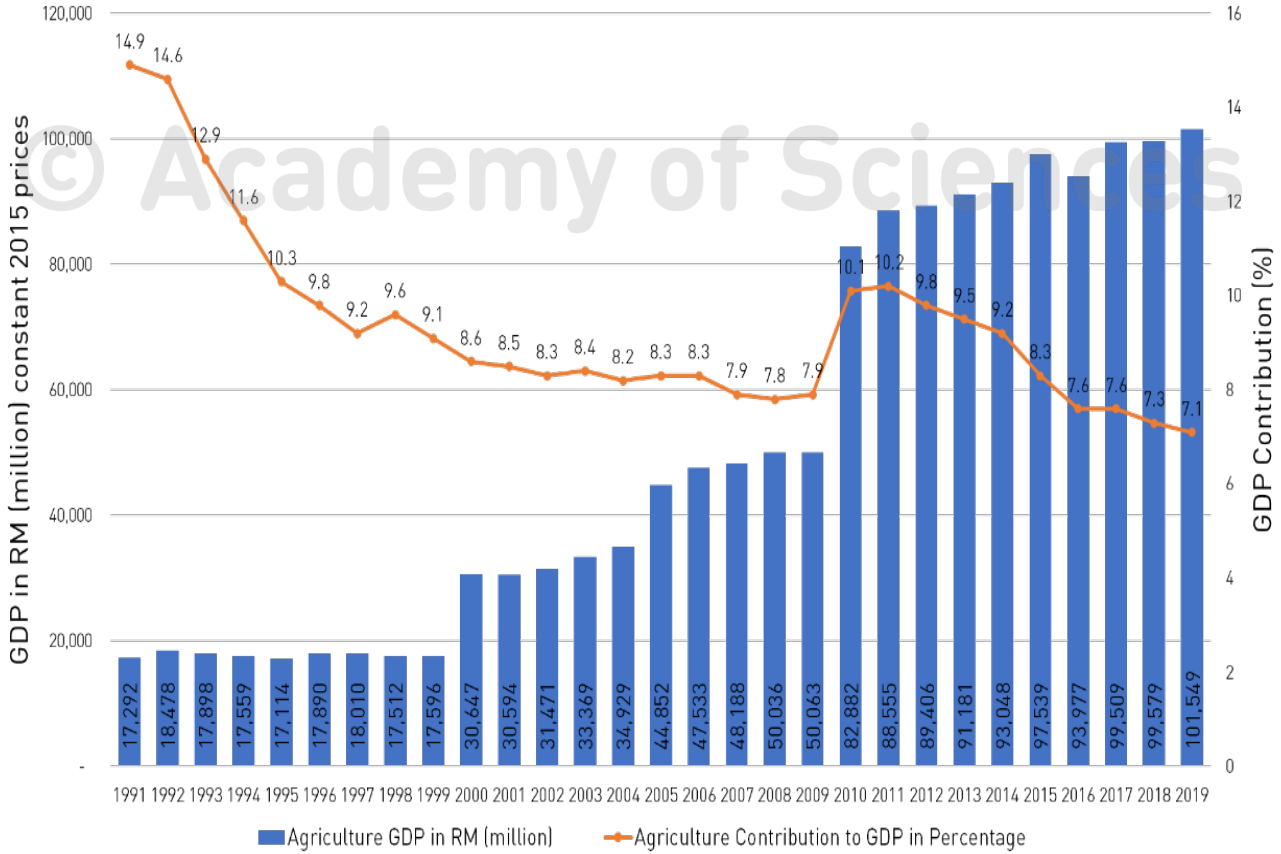
Reference: MyKE III, EPU 2016

CONTRIBUTION OF KEY SECTORS TO THE ECONOMY: AGRICULTURE

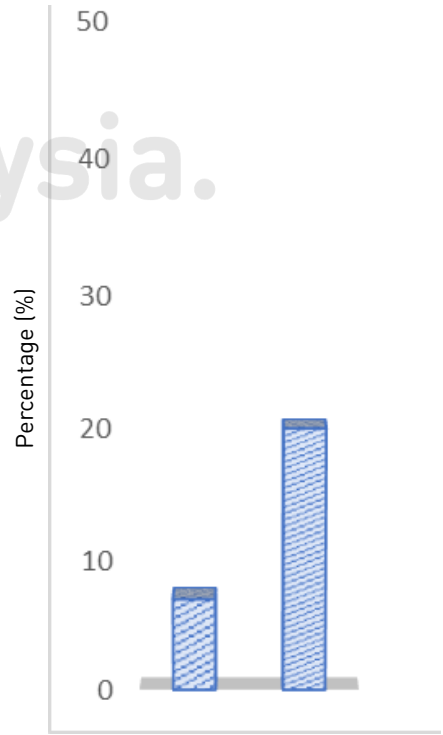
GDP CONTRIBUTION OF AGRICULTURE SECTOR

20% (1990) to **7%** (2020)

MALAYSIA'S AGRICULTURE INDUSTRY: GDP AND GDP CONTRIBUTION

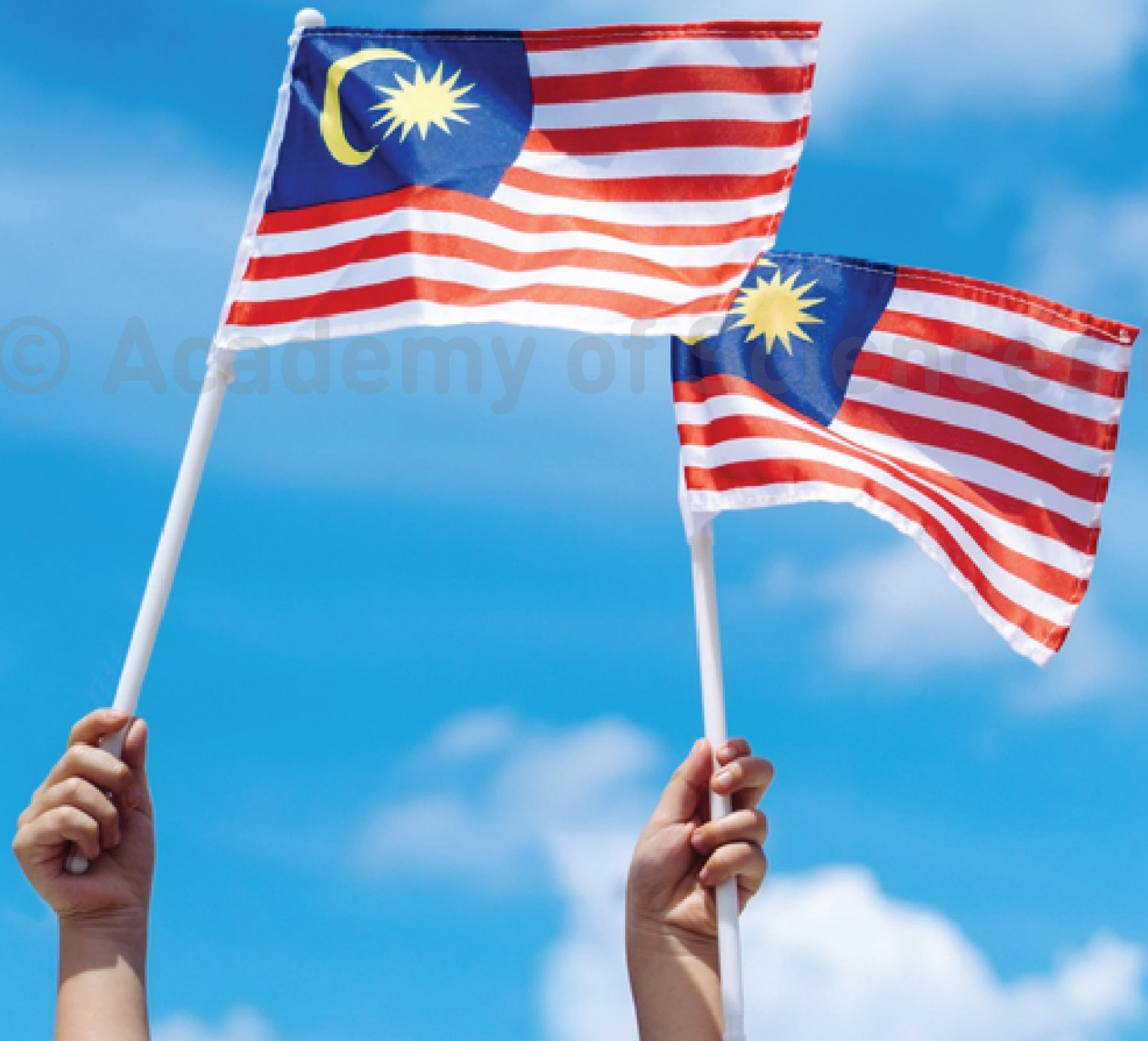


R&D IN THE AGRICULTURE SECTOR



Reference: MyKE III, EPU 2016

VISION 2020: REALITY CHECK



Population

18.52 million
(1991)

32.70 million
(2020)

GDP

49.14 billion USD
(1991)

338.28 billion USD
(2020)

VISION 2020: REALITY CHECK

GNI per capita

2,560 USD
(1991)

11,230 USD
(2020)

DELAYED

15,000 USD
(Target in 2020)

VISION 2020: REALITY CHECK

One 'Bangsa Malaysia' Societal Tolerance

(Source: Legatum Prosperity Index)

Maximum score of 100

19.7 (2010)

24.5 (2020)

MORE EFFORT NEEDED

VISION 2020: REALITY CHECK

Environmental Well-being

(Reference: EPI, Yale)

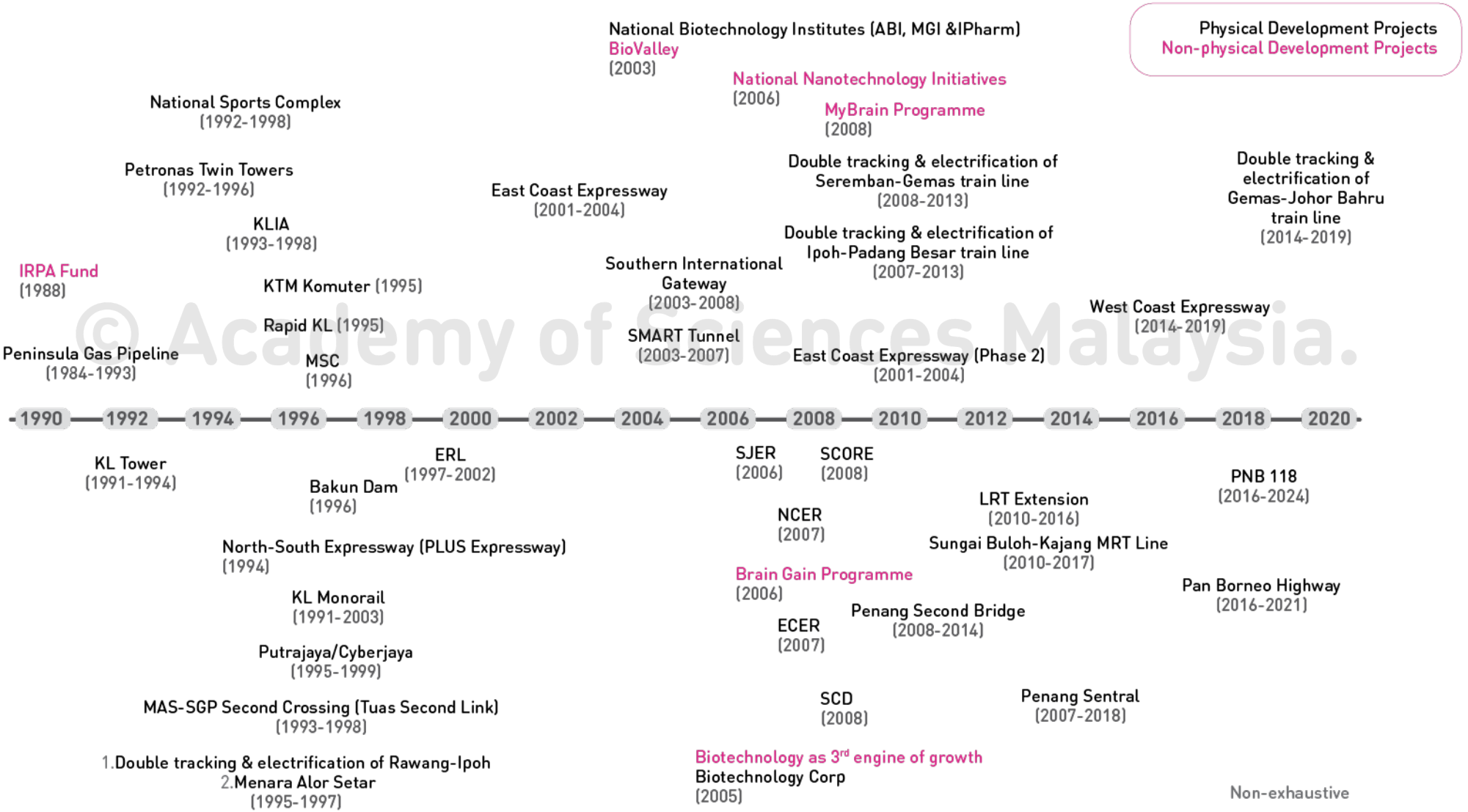
Malaysia ranked

25th (2012) out of 132; Score 62.5

68th (2020) out of 180; Score 47.9

PERFORMANCE DECLINE

3 DECADES OF NATIONAL PROJECTS (1991-2020): REALITY CHECK



MULTIMEDIA SUPER CORRIDOR: THE SEVEN FLAGSHIPS

PARTIALLY ACHIEVED

- ✅ ELECTRONIC GOVERNMENT
- ✅ NATIONAL MULTI-PURPOSE CARD
- ✅ R&D CLUSTER
- ✅ TELEMEDICINE

PARTIALLY ACHIEVED : LOW VALUE-ADD

- ☑ BORDERLESS MARKETING CENTRE
- ☑ WORLDWIDE MANUFACTURING WEB

NOT ACHIEVED

- ❌ SMART SCHOOLS

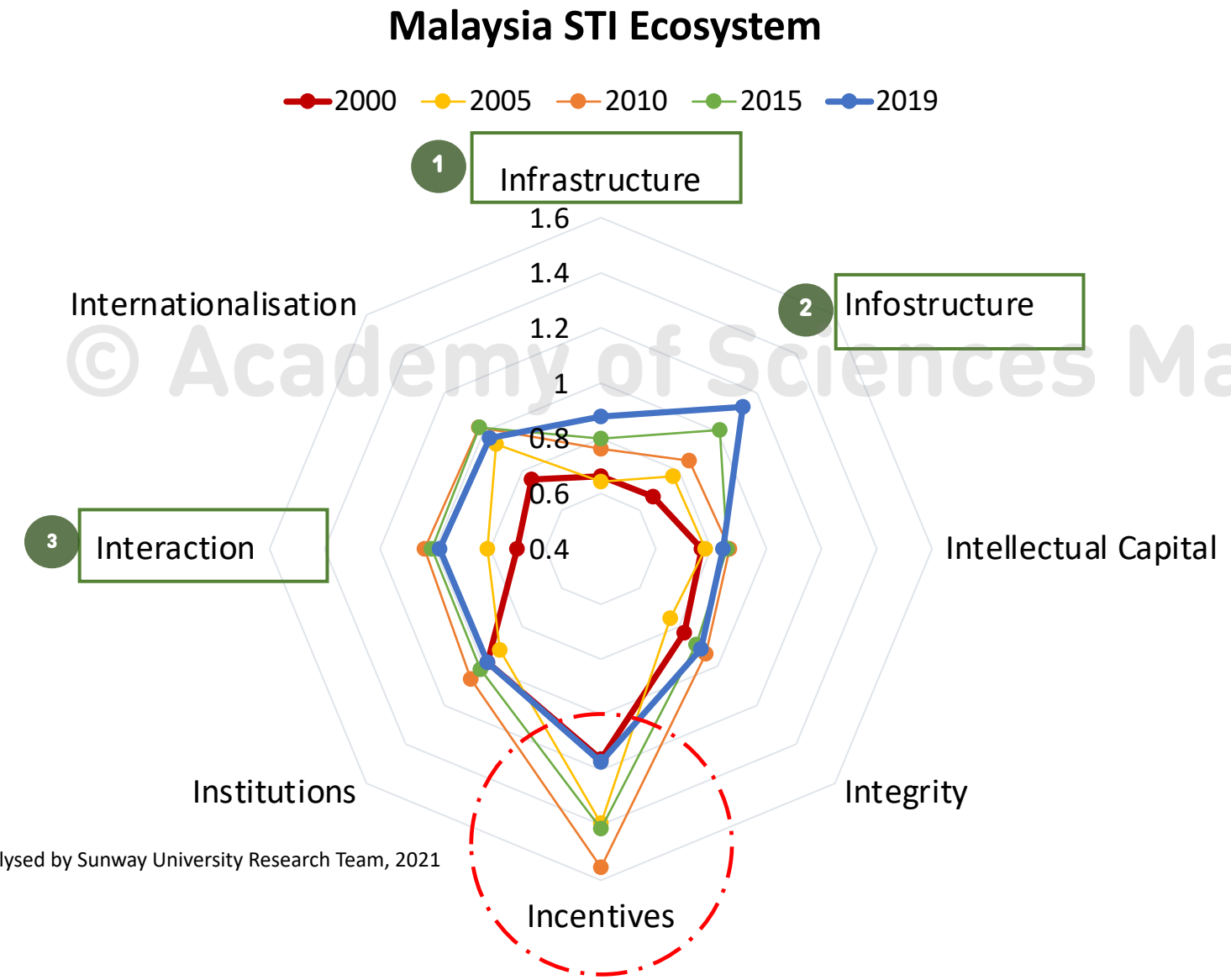
6 PARTIALLY ACHIEVED

1 NOT ACHIEVED

The desired end-state of the original MSC:

- To achieve exponential growth by creation of world-class infrastructure to attract world-class companies
- To spur global champion to take endogenous technology to the next level.

REALITY CHECK OF MALAYSIAN INNOVATION ECOSYSTEM



Analysed by Sunway University Research Team, 2021

Improvement seen in:

- ✓ Infrastructure
- ✓ Info-structure and,
- ✓ Interaction

Most significant **decline** seen in the Incentive's indicator

STI ecosystem has not changed significantly from 2010 to 2019.

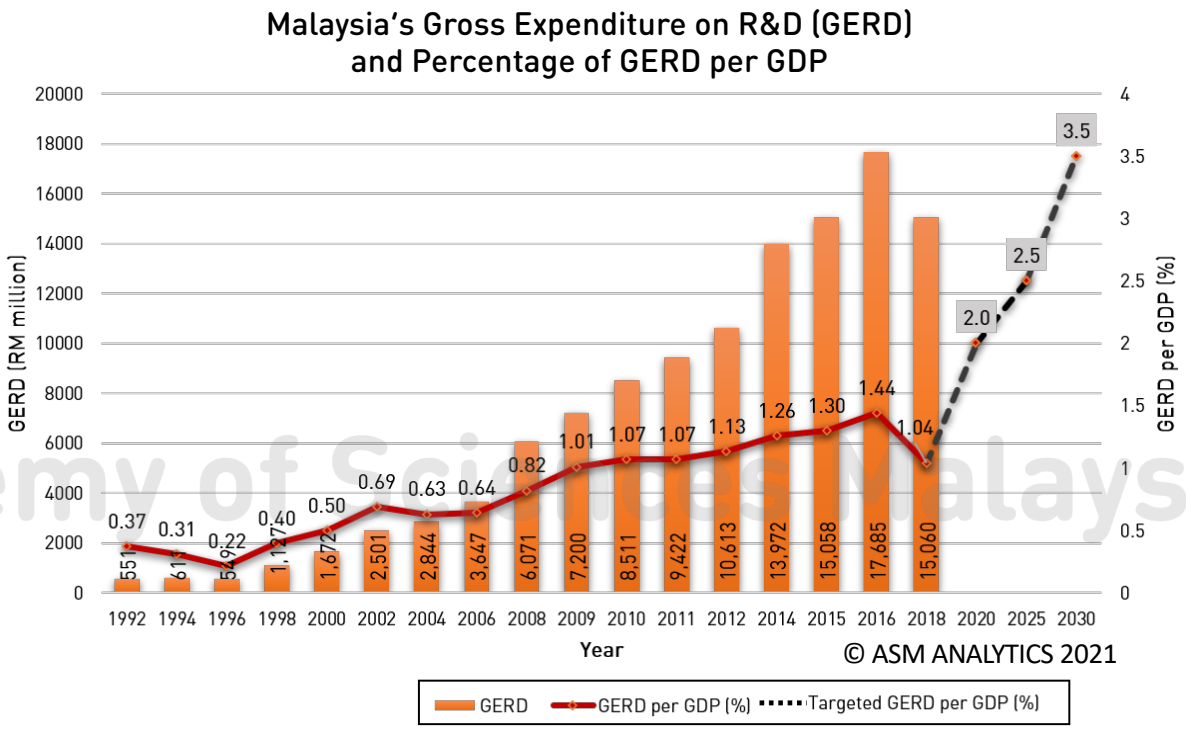
HOW ARE WE DOING IN GERD ?

Global average of GERD was **1.79%** in 2018 (UNESCO, 2021).

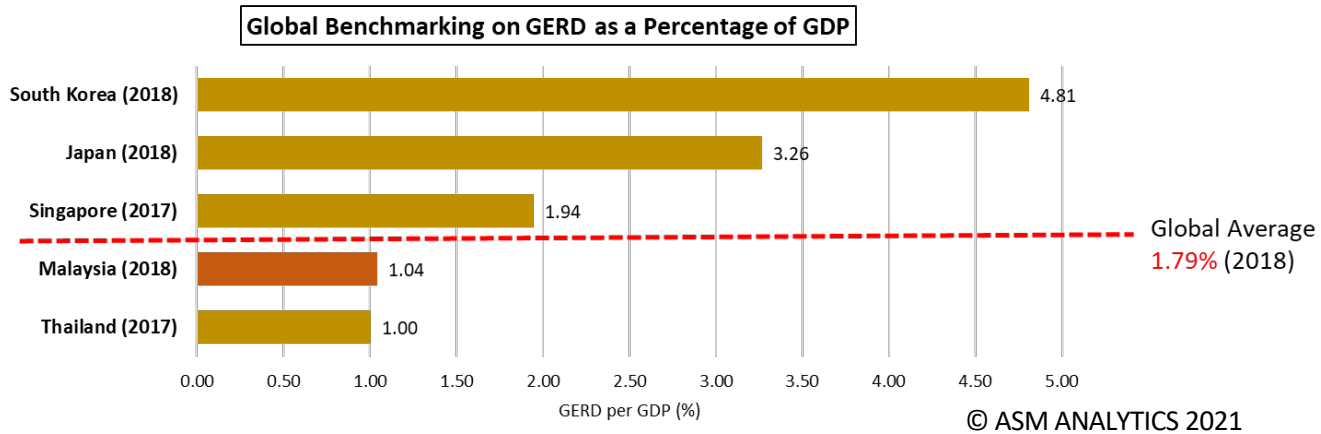
GERD/GDP fell sharply in 2018 to **1.04%**

[Target for 2025: **2.5%** (NPSTI 2021-2030)] – tall order – specific action/implementation plan to achieve (script)

Reinvigorate private sector participation (BERD: 43.9% (2018) to 70% (2025))



2.5% by 2025
3.5% by 2030
GERD/GDP, Malaysia
(Source: NPSTI 2021-2030, MOSTI)



70% by 2025
BERD, Malaysia
(Source: Twelfth Malaysia Plan 2021-2025, EPU)

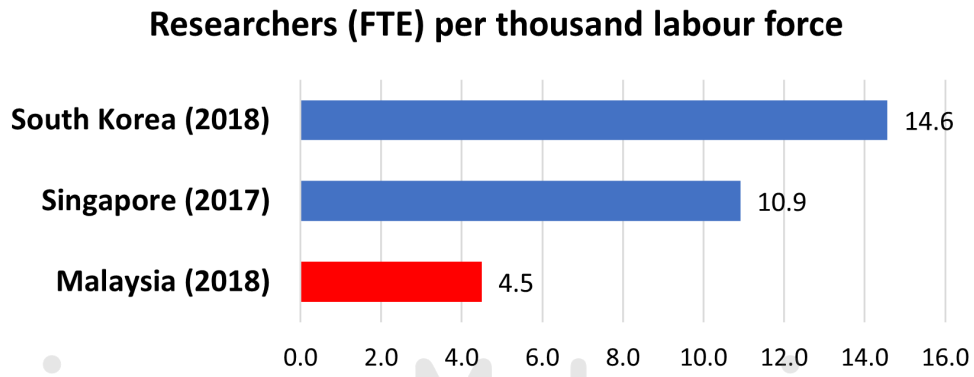
HOW ARE DO DOING IN TERMS OF KNOWLEDGE WORKERS?

RESEARCHERS

4.5 FTE/1,000 labour force
[Target for 2025: **13 for every 1,000 RSET labour force** (NPSTI 2021-2030)]

Malaysia: 2,184.7/1,000,000 (2018)
Upper middle nation:
1,104.9 /1,000,000 (2018)
High income nation:
4,357.2/1,000,000 (2018)

DISTRIBUTION OF RESEARCHERS
79.9% researchers are in HLIs;
15.8% in business enterprises



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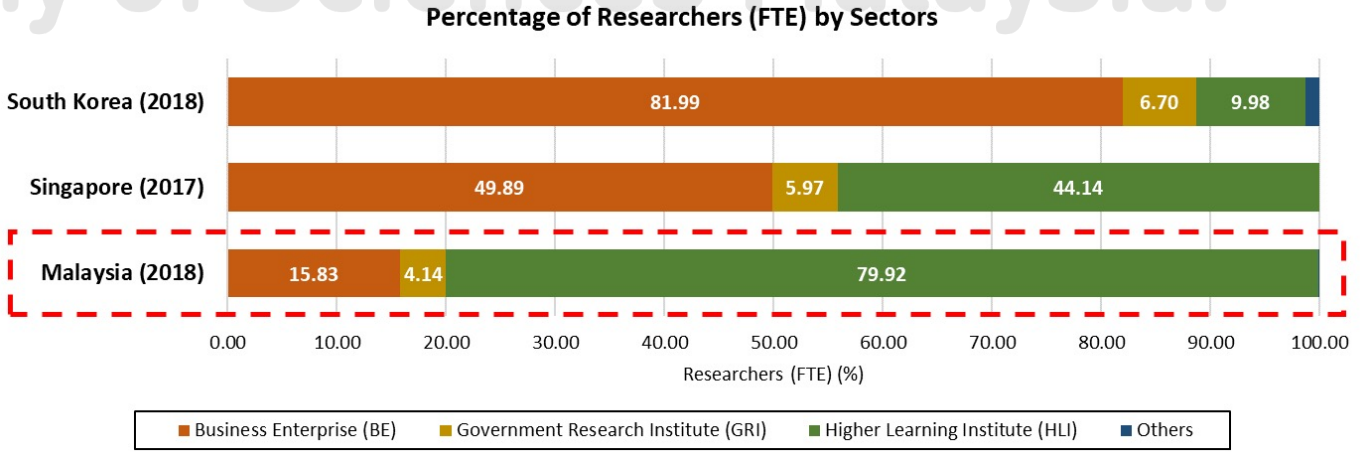

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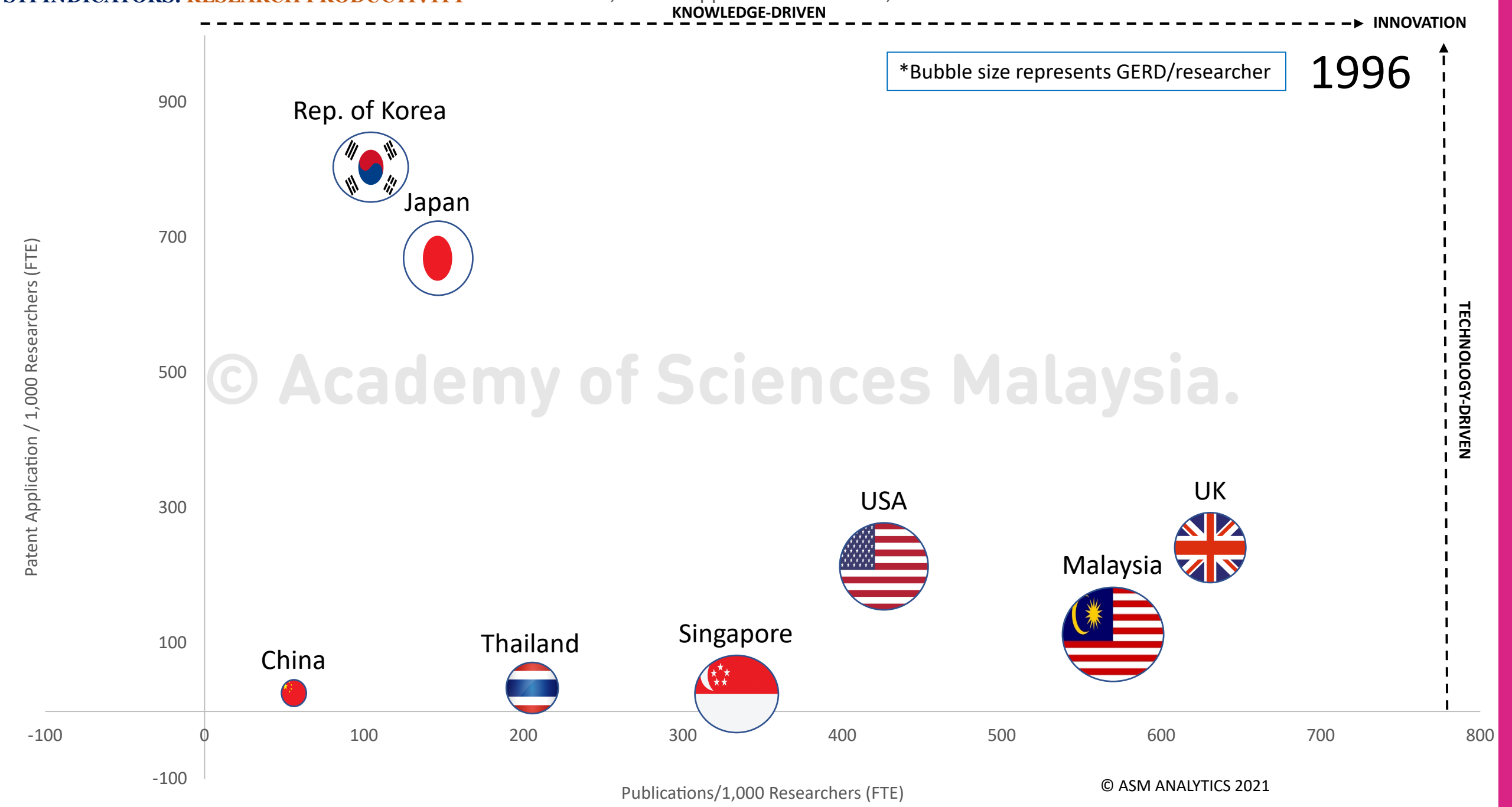
- Malaysia's number of researchers stood at 4.5 FTE /1000 labour force (2018), below average of innovative countries like South Korea & Singapore.
- For total researchers per million inhabitants, Malaysia has achieved above the upper-middle countries, yet below average of the high-income category.
- Malaysia's distribution of researchers are mainly in Higher Learning Institutions limiting innovation capabilities of our industries

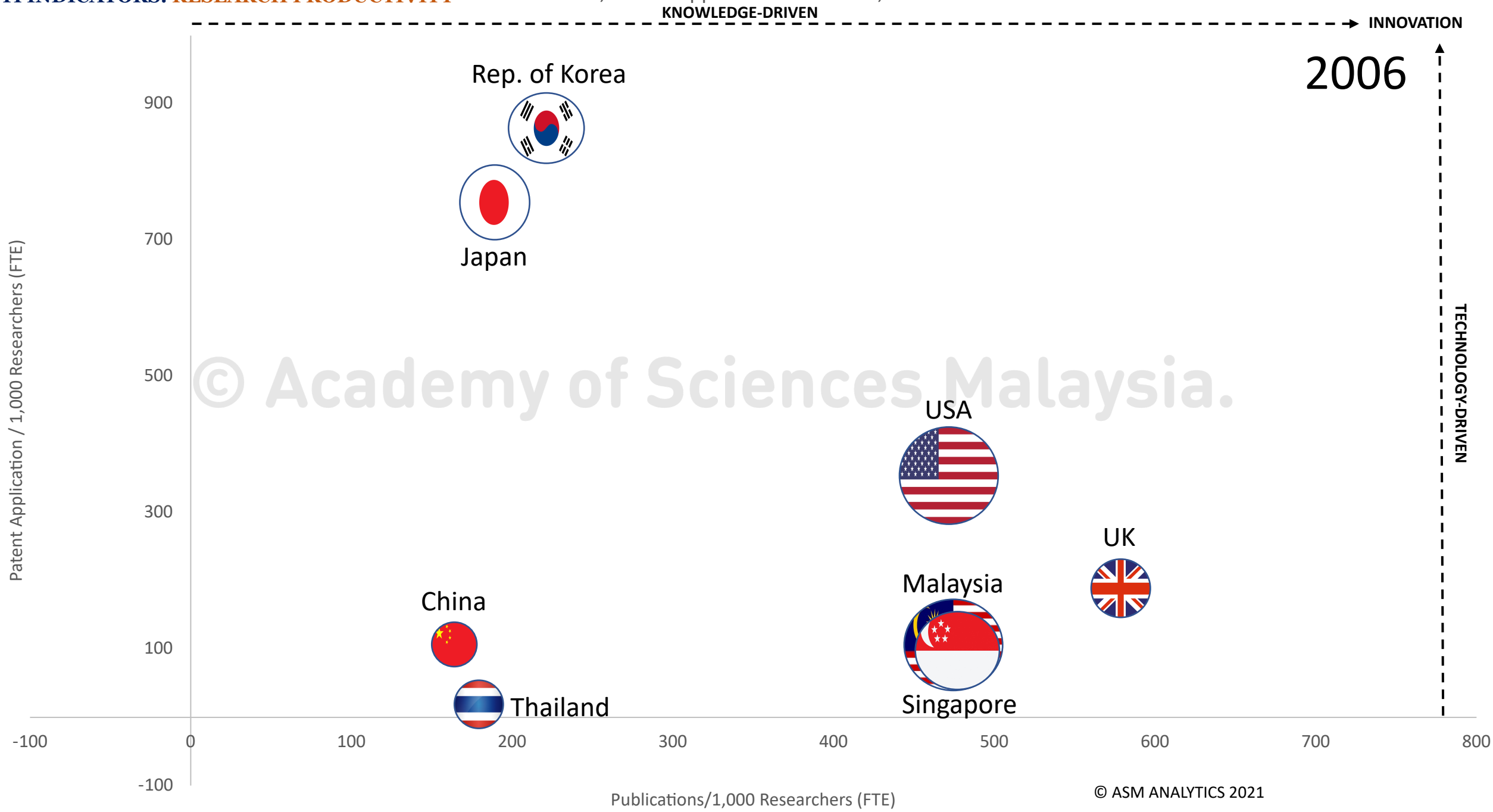
STI INDICATORS: RESEARCH PRODUCTIVITY

Publication, Patent Application and GERD, 1996



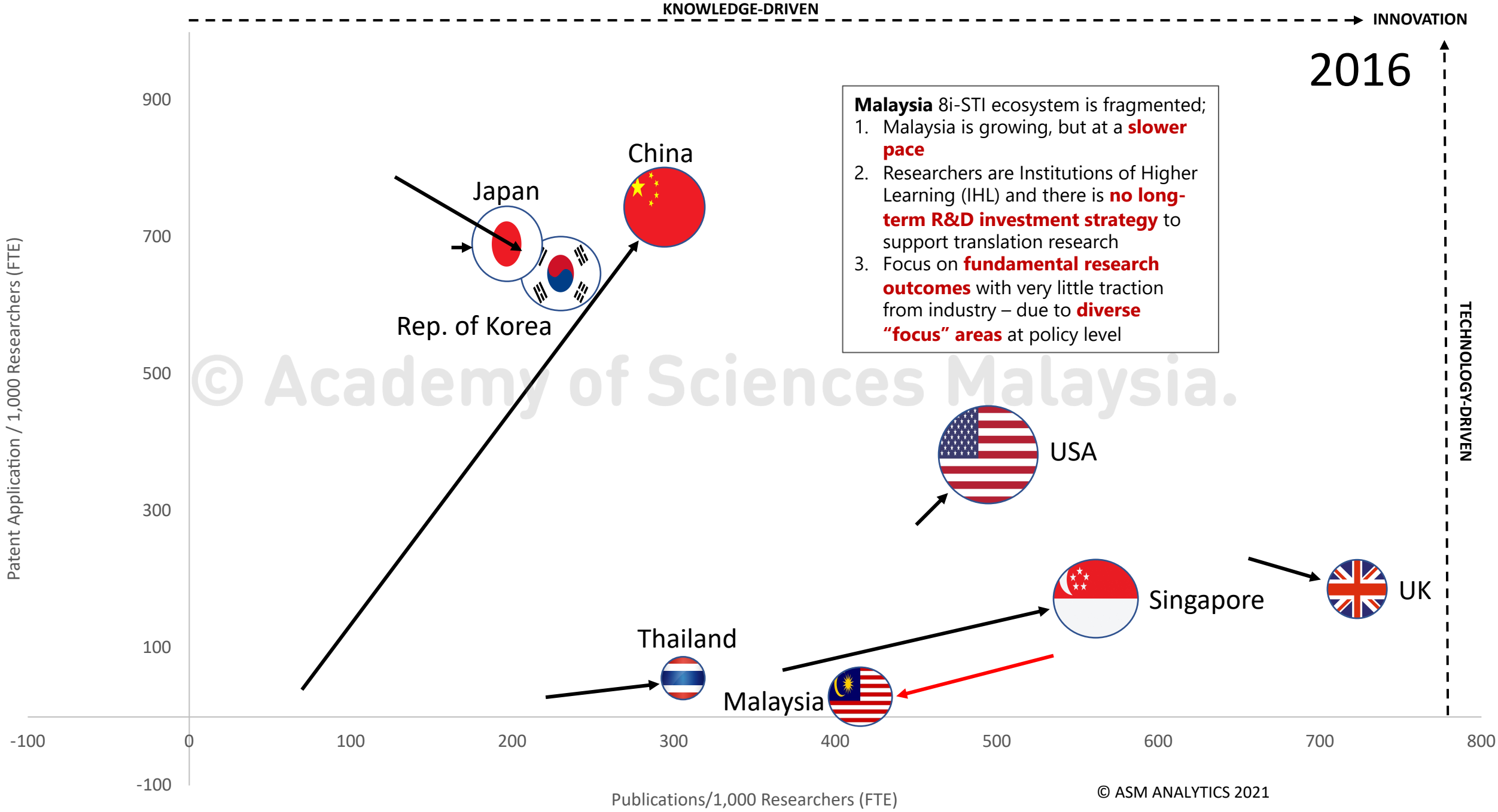
STI INDICATORS: RESEARCH PRODUCTIVITY

Publication, Patent Application and GERD, 2006



STI INDICATORS: RESEARCH PRODUCTIVITY

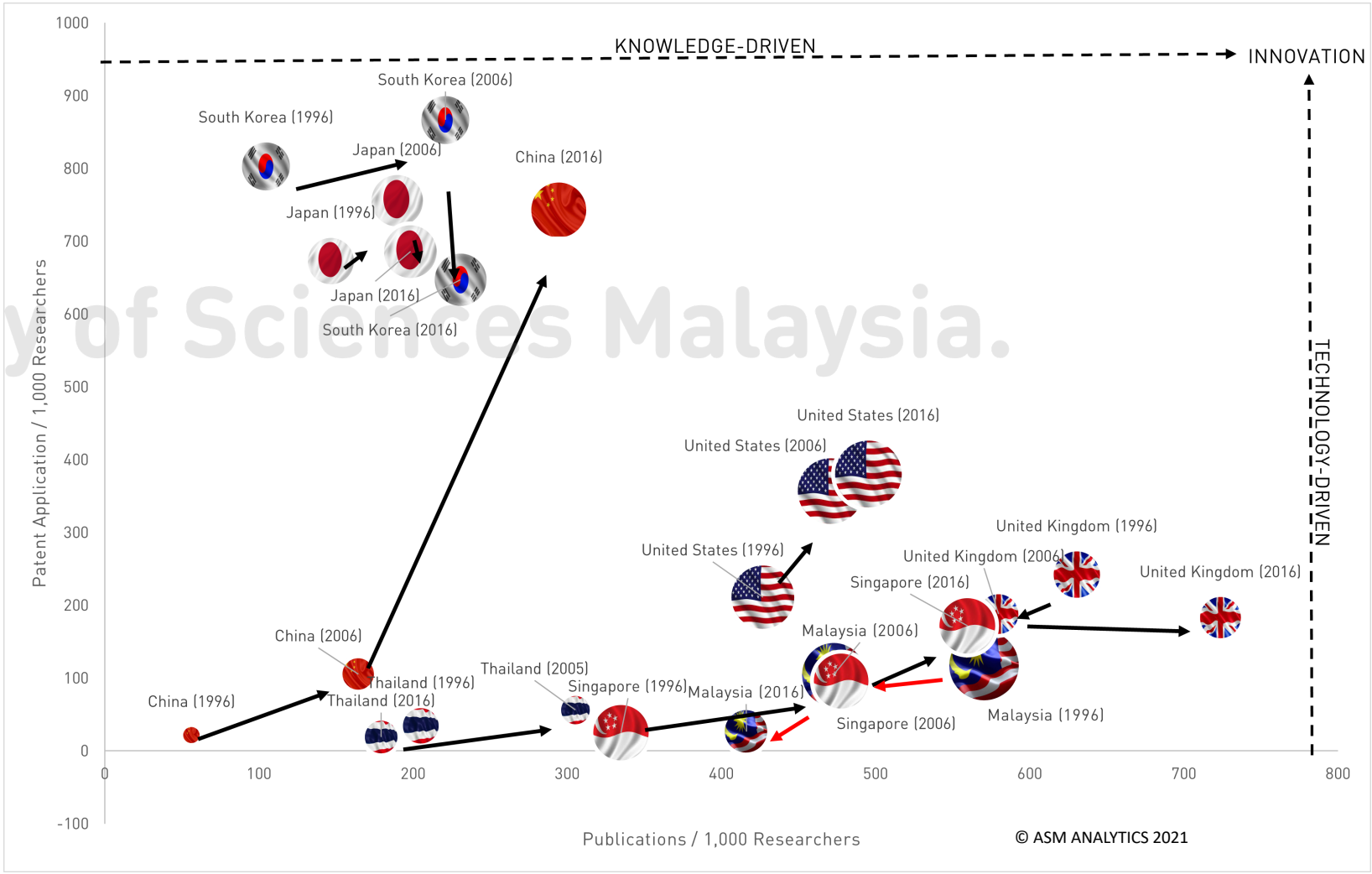
Publication, Patent Application and GERD, 2016



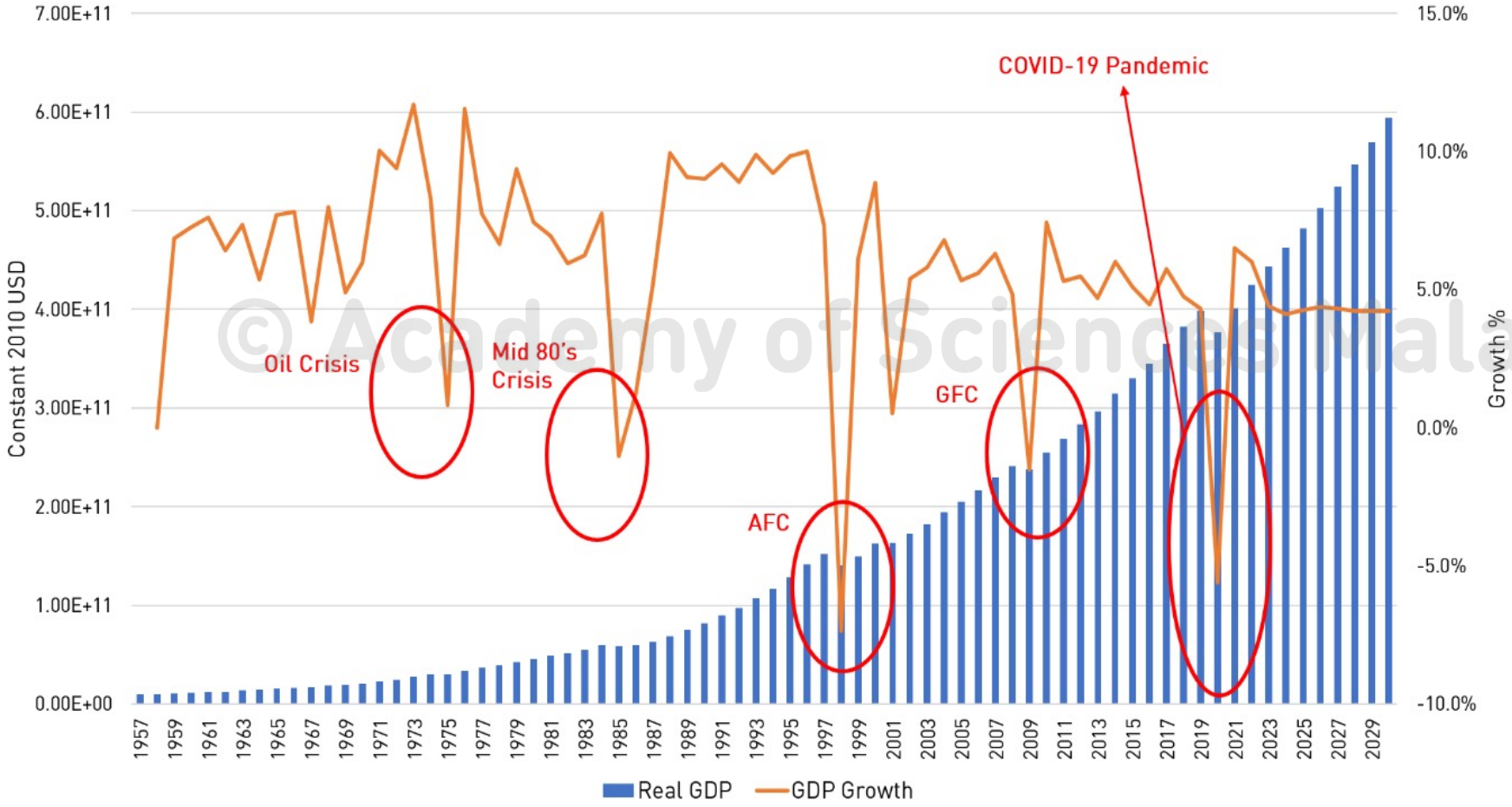
HOW ARE WE DOING IN THE KEY STI INDICATORS?

RESEARCH PRODUCTIVITY

RESEARCH PRODUCTIVITY: PUBLICATIONS AND PATENT / 1,000 RESEARCHERS



MALAYSIA'S ECONOMIC GROWTH

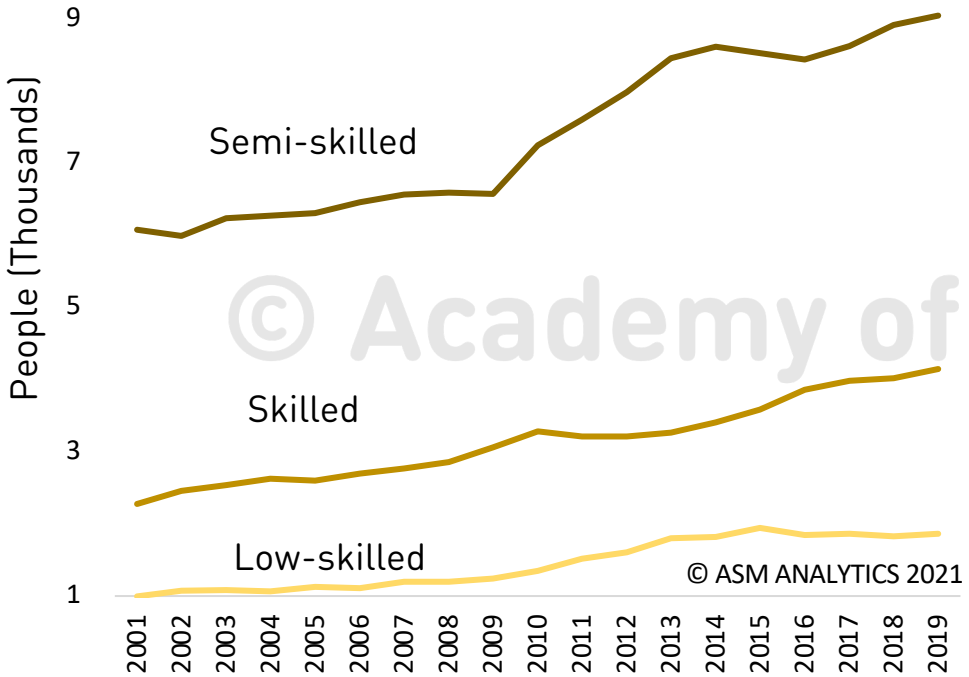


Analysed by Sunway University Research Team, 2021

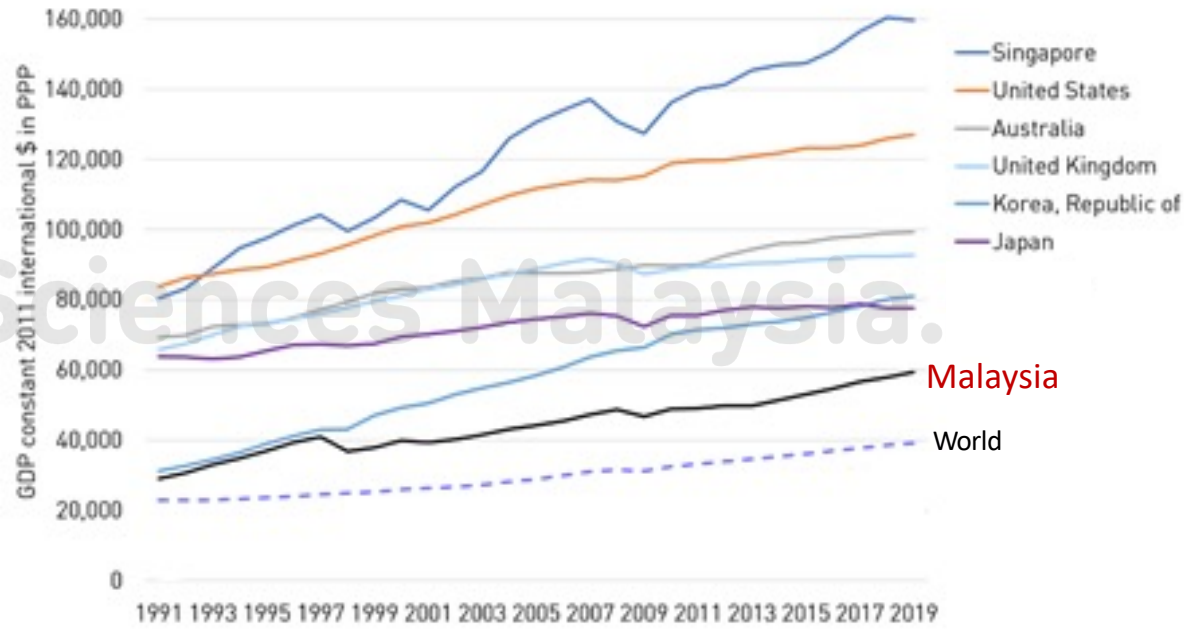
- Malaysia's economy shows an upward trend in GDP
- Volatile GDP growth rates seen
- Malaysia struggles to manage external shocks to the economy
- Calls for resilience and future proofing

HIGH SKILLED WORKFORCE IMPERATIVE (INTANGIBLE)

Employment by skill, 2001 - 2019



Labour Productivity, 1991 - 2019

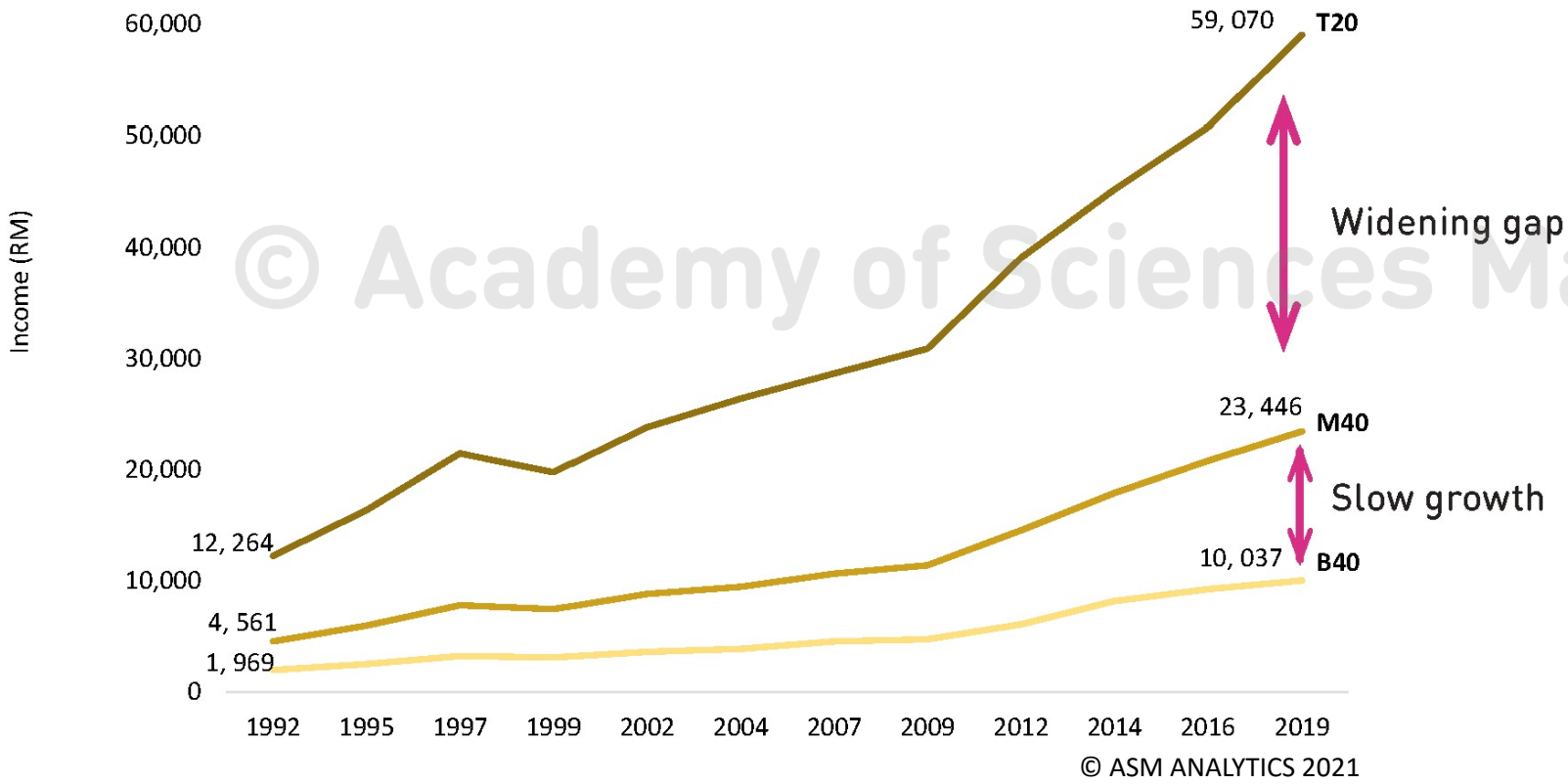


Analysed by Sunway University Research Team, 2021

- Global Average for high-skilled workforce is 35% (2018)
- Malaysia through Industry4WRD targets an increase in the number of high-skilled workforce employed in the manufacturing sector from 18% (2016) to 35% (2025)

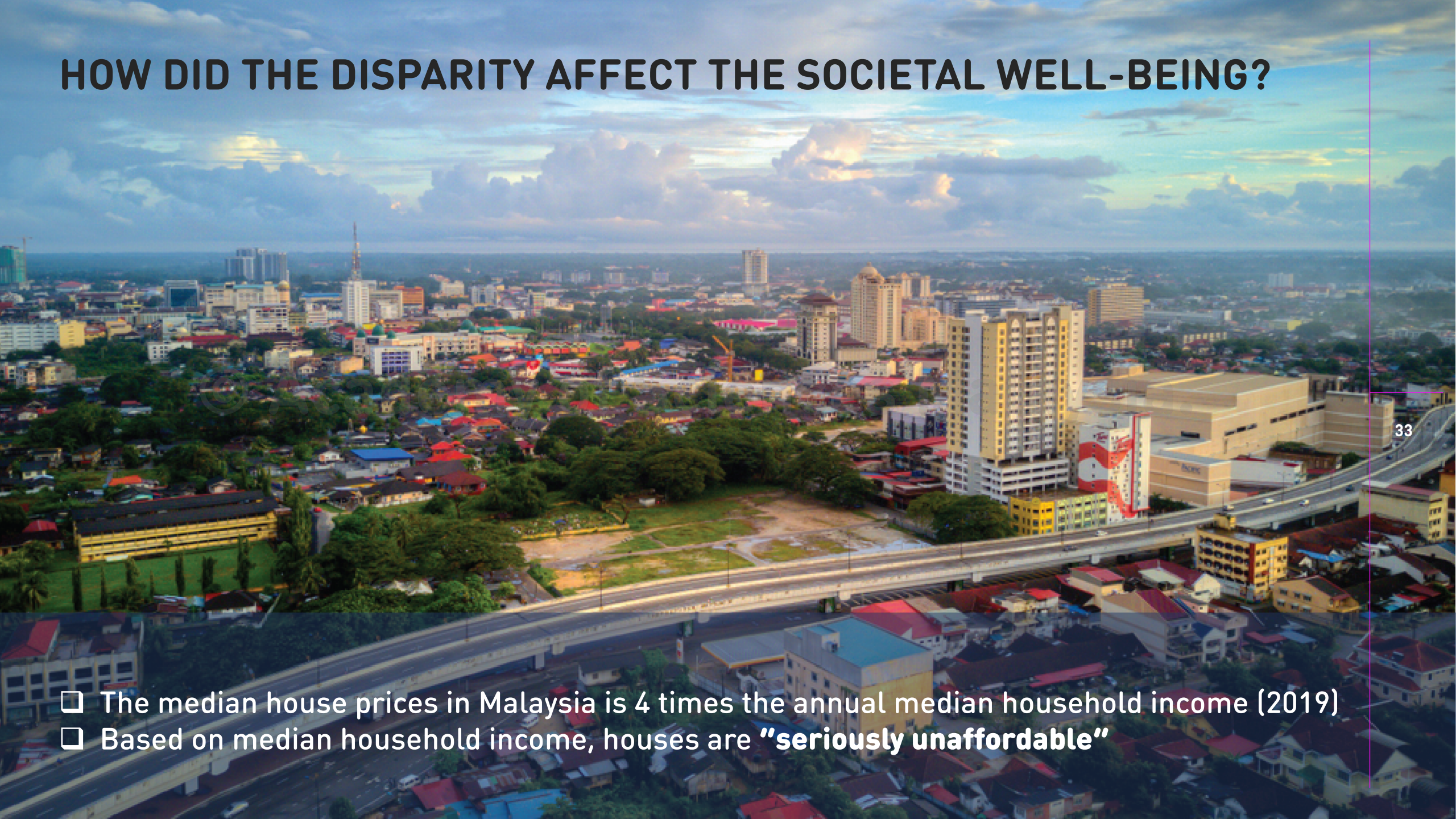
- Malaysia's knowledge workers struggled with productivity growth performance behind those advanced economies attributed to average knowledge-intensive activities taking place for higher innovative capabilities.

HOW WIDE IS THE INCOME DISPARITY GROWTH?



- After 30 years, the gap has just gotten wider!
- About half of Malaysian workers, or 4.4 million people are B40, who earn RM2,160 or less a month (BNM, 2018)
- The national mean poverty line income for households in Malaysia in 2019 is RM2,208 per month (with RM1,169 for food and RM1,038 for non-food items) (DOSM, 2020)

HOW DID THE DISPARITY AFFECT THE SOCIETAL WELL-BEING?



- The median house prices in Malaysia is 4 times the annual median household income (2019)
- Based on median household income, houses are **"seriously unaffordable"**

HOW DID THE DISPARITY AFFECT THE SOCIETAL WELL-BEING?

- **1 in 4 Malaysians** turn to cheaper, less nutritious food
- **1 in 5 Malaysian** households could not afford to feed their children a variety of food (UNICEF, 2018; Ahmad et al., 2020)

HOW DID THE DISPARITY AFFECT THE SOCIETAL WELL-BEING?

- **Fattest nation in Asia - 1 in 2 adults** in Malaysia are overweight or obese (NHMS, 2019)

- **1 in 5 children** under five years old have stunted growth (UNICEF, 2019a)
- **1 in 10 children** under five years old are thinner than normal due to inadequate feeding (UNICEF, 2019a)

HOW DID THE DISPARITY AFFECT THE SOCIETAL WELL-BEING?

- Prevalence of mental health issues in Malaysia **tripled** from 10.7% in 1996 to 29.2% or 4.2 million people in 2016 (NHMS, 2019)
- 1 psychiatrist to 100,000 population (MOH, 2020)
  (WHO recommendation is 1 to 10,000 population)

PROPOSED STRATEGIC INTERVENTIONS

TALENT GAP

- ❑ Develop an integrated Talent Development Master Plan

HEALTH-RELATED ISSUES

- ❑ Finance longitudinal study to formulate long-term health policies
- ❑ Reintroduce a comprehensive registry with end-to-end data collection and monitoring of health status

SOCIO-ECONOMIC DISPARITIES

- ❑ Formulate multifaceted policies from socioeconomic disparity data to reduce inequities suffered by Malaysians

HOW IS THE ENVIRONMENTAL WELL-BEING OF THE NATION?

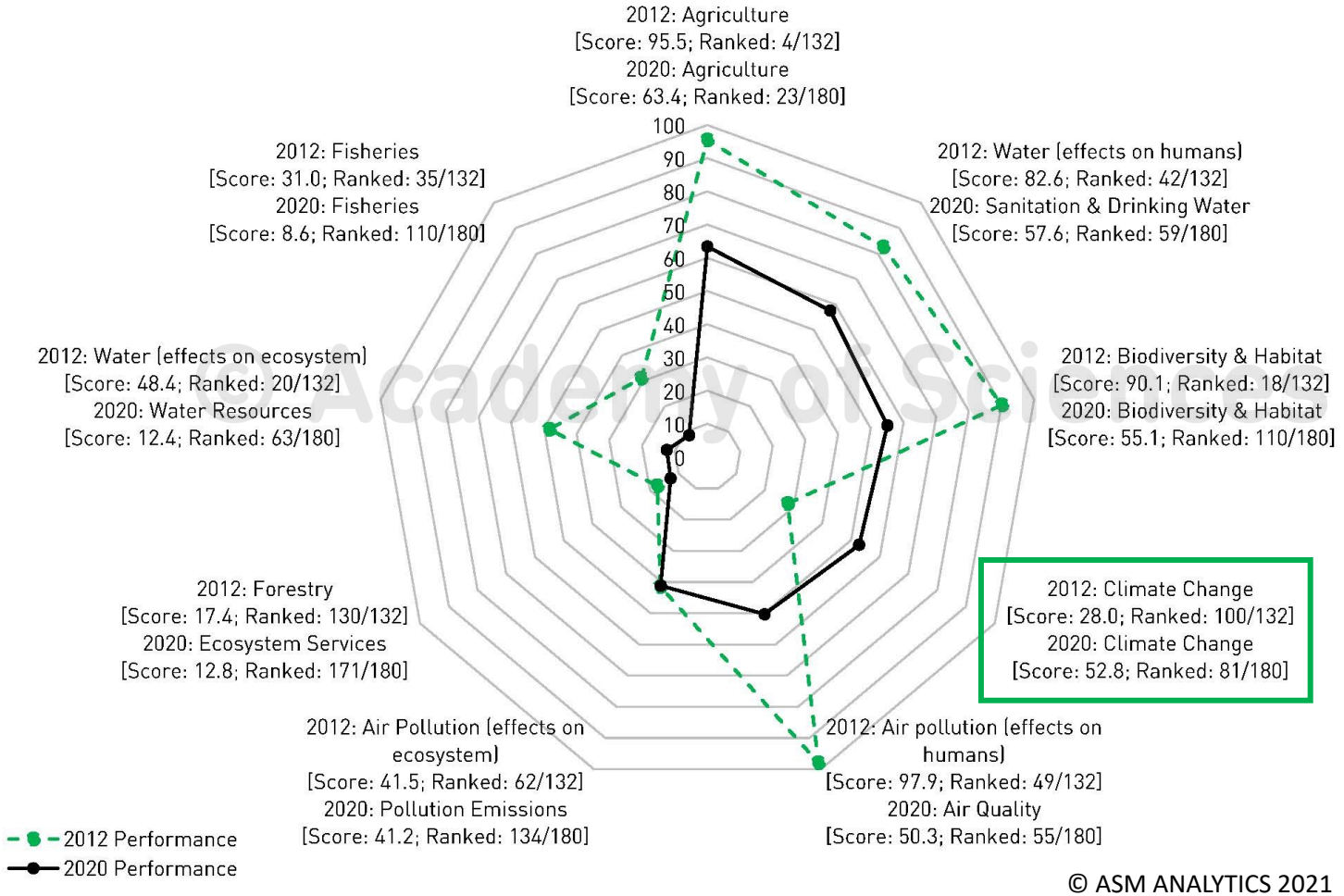


Figure 5.2: Malaysia's Performance in EPI 2012 and 2020

- Over the last eight years (2012 to 2020) improvement was only seen in the **climate change indicator**, performance in all other areas have declined.
- But Malaysia ranked **81/180** countries for Climate Change Indicator.

WHAT ARE THE PRELIMINARY ESTIMATES OF MALAYSIA'S ENVIRONMENT-RELATED COSTS?

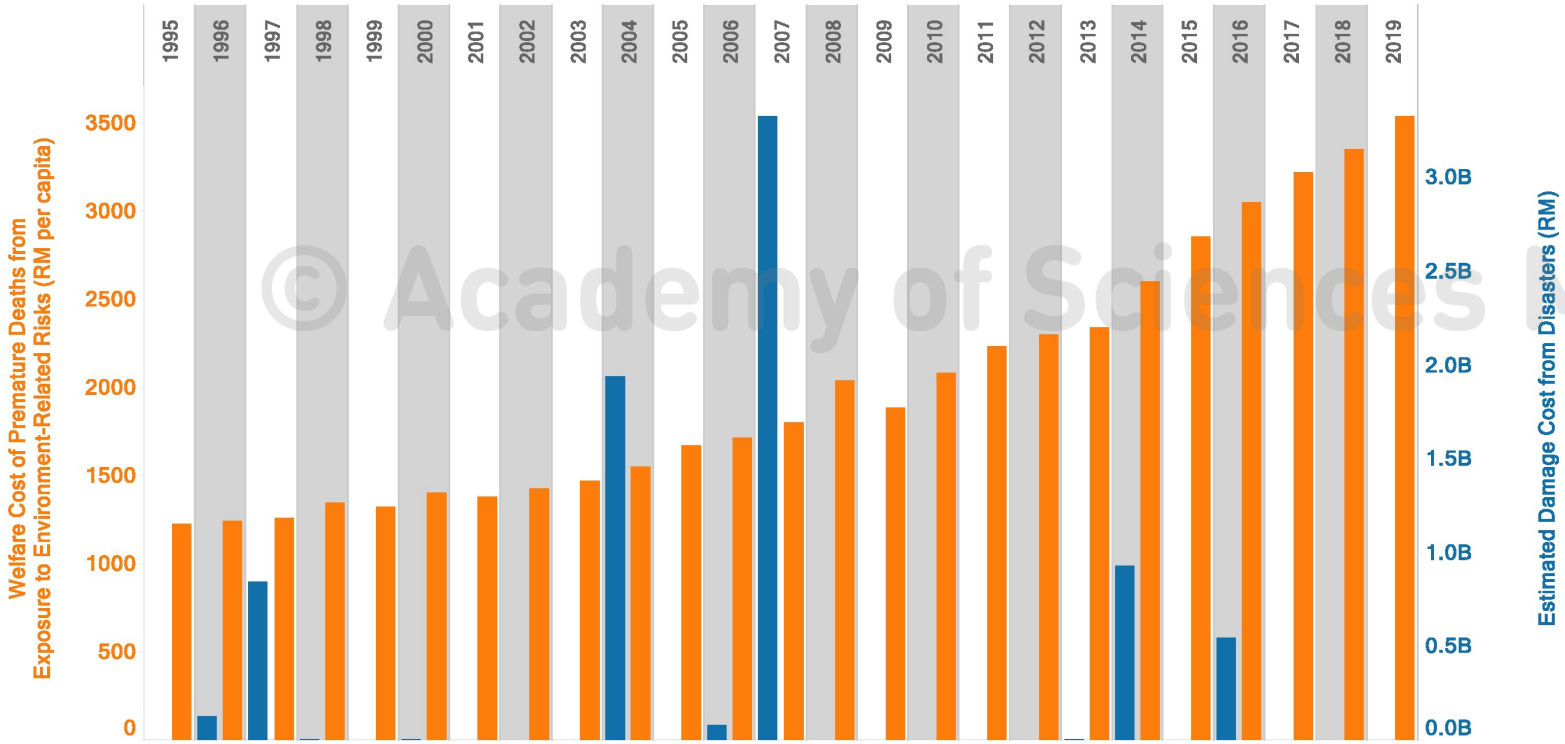


Figure 5.31: Estimated costs of Environmental-Related Issues

- Over the last 24 years, Malaysia has cumulatively lost an estimated RM7.8 billion to environment-related disasters.
- An estimated RM 947.2 billion to welfare cost of environment-related premature deaths.
- That is an average loss of RM39.8 billion per year due to environment-related causes. Cost about 3% GDP loss in 2019 and 2020.

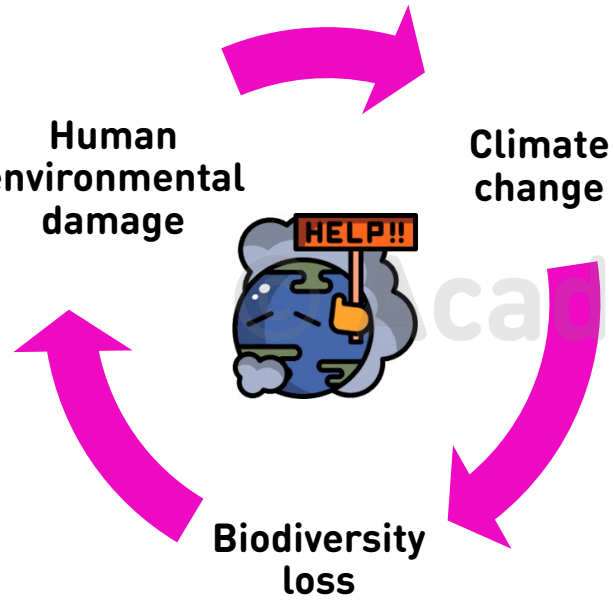
ENVIRONMENTAL GOVERNANCE

The Environment portfolio throughout six Malaysia Plans (1990-2020)

6th MP (1990-1995)	7th MP (1996-2000)	8th MP (2001-2005)	9th MP (2006-2010)	10th MP (2011-2015)	11th MP (2016-2020)
Ministry of Science, Technology and Environment	Ministry of Science, Technology and Environment	Ministry of Science, Technology and Environment	Ministry of Science, Technology and Innovation	Ministry of Science, Technology and Innovation	Ministry of Science, Technology and Innovation
			Ministry of Natural Resources, and Environment	Ministry of Natural Resources, and Environment	Ministry of Environment and Water
Ministry of Energy, Telecommunications and Posts	Ministry of Energy, Communications and Multimedia	Ministry of Energy, Telecommunications and Posts	Ministry of Energy, Water and Communications	Ministry of Energy, Green Technology and Water	Ministry of Energy, and Natural Resources

- In the past we have seen matters of environment **pegged to Ministries with multiple portfolios.**
- A focused approach prioritising Malaysia's natural assets and its sustainability, together with **political will** is envisioned to implement **evidence-based policies** that align with environmental conservation to support the country's progress.

PROPOSED STRATEGIC INTERVENTIONS



GOVERNANCE

1

To mainstream management and governance of the environment and natural assets (physical & non-physical)

2

To promote compliance monitoring and enforcement activities for sustainable management of environmental well-being

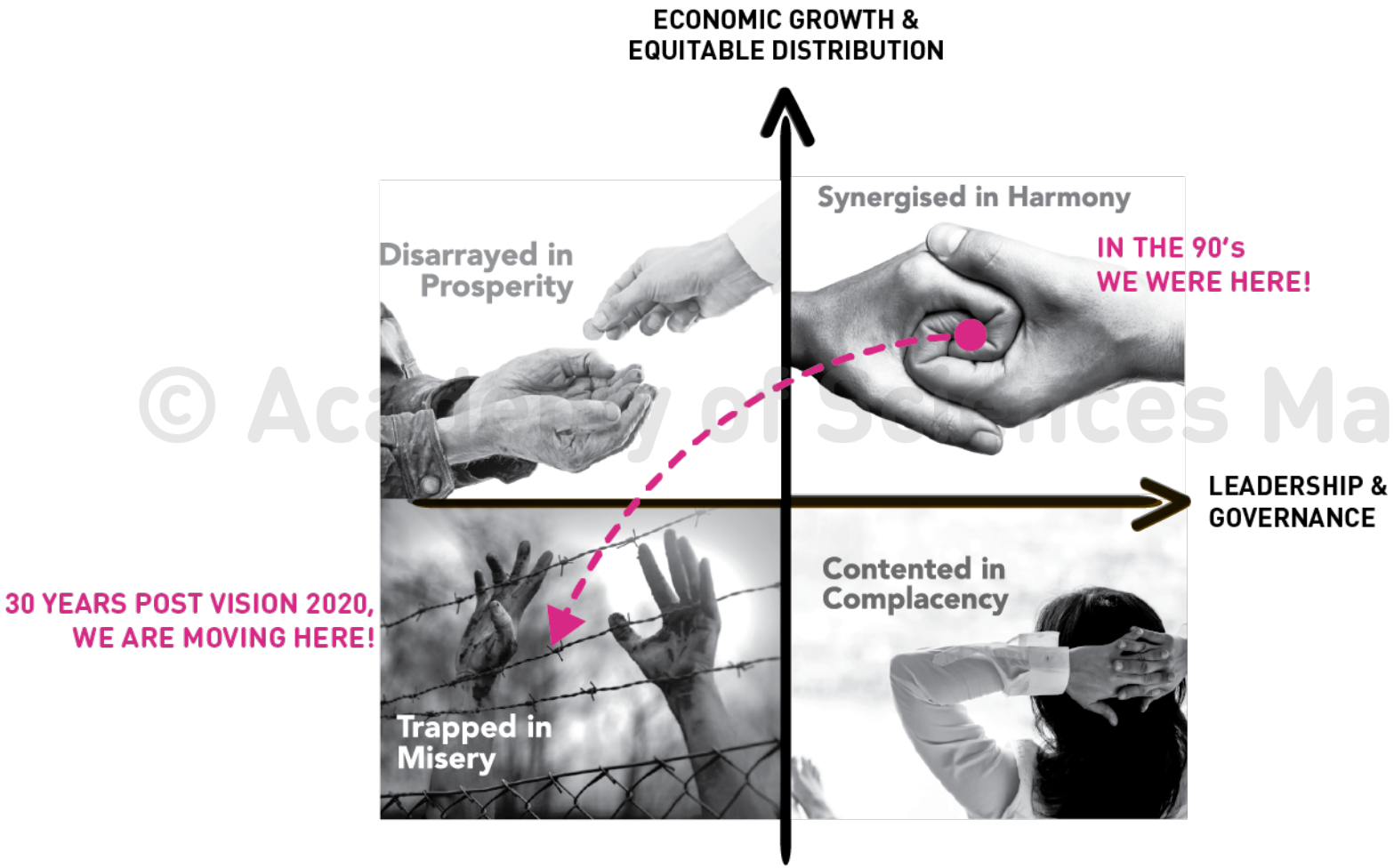
3

To strengthen institutional capacity and regulatory framework both at Federal and State levels.

- Top environmental-related global risks (Global Risk Report, WEF 2021) are inter-connected issues that should be tackled and resolved together.

FUTURE PROOFING MALAYSIA

THE SCENARIO WE ARE AT TODAY

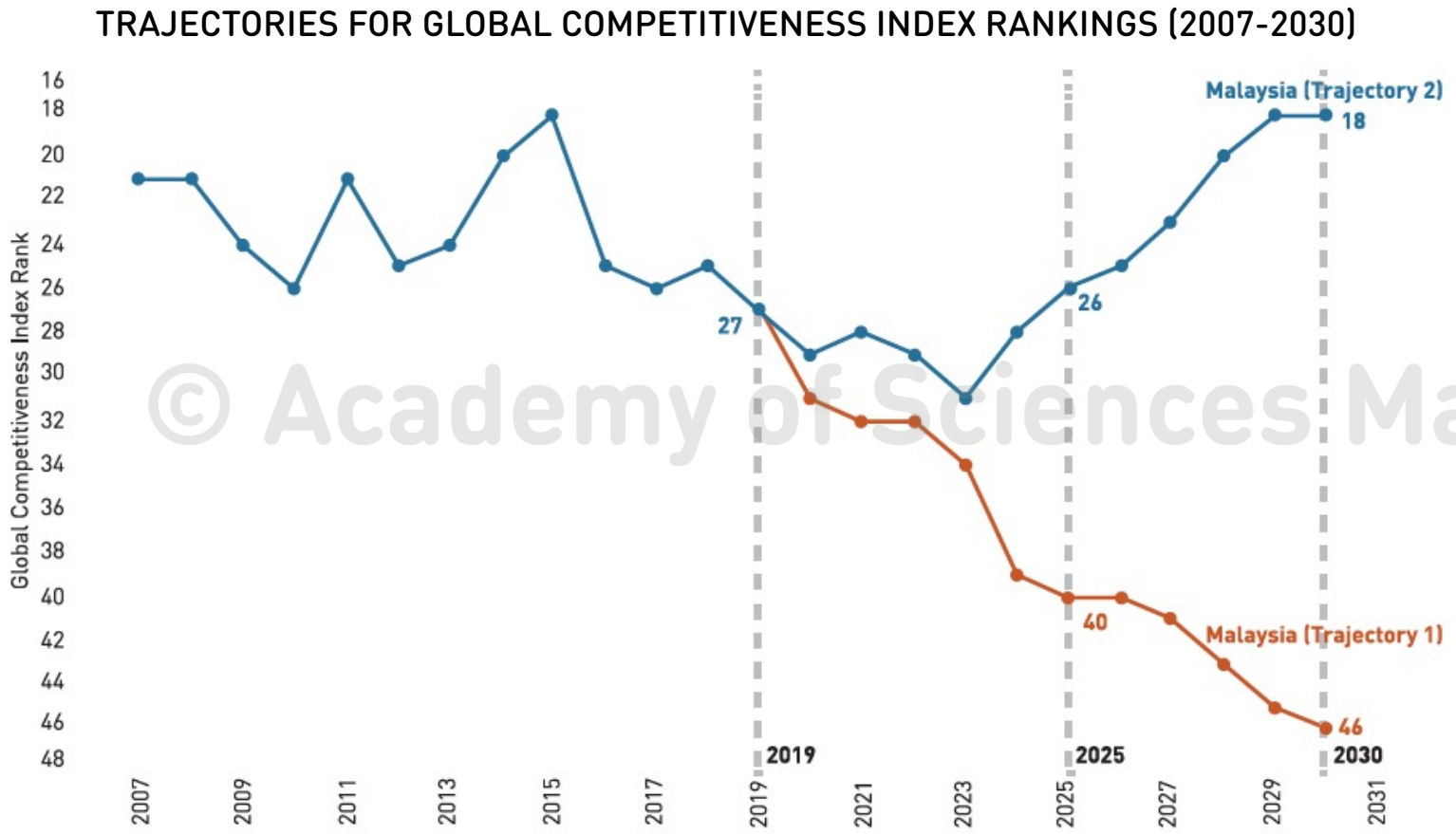


Reference: Envisioning Malaysia 2050: A Foresight Narrative (ASM, 2017)

Note: Leadership and Governance along with Economic Growth and Equitable Distribution have been identified to be the two most dominant of the nine key drivers of change that are critical in charting Malaysia's journey towards 2050.

- In the 90s Malaysia was known as the **Asian Tiger.**
- Backed by good governance, Malaysia enjoyed robust economic growth and equitable wealth distribution.
- Doing a reality check by the end of year 2020, evidences show most Malaysians are trapped in misery – with the COVID-19 pandemic showcasing poor decision making causing severe blow on their livelihood and overall well-being.

THE IMPACT OF STI ECOSYSTEM ON GLOBAL COMPETITIVENESS



Analysed by Sunway University Research Team

- Malaysia's global competitiveness is closely tied to the development of the nation's STI ecosystem.
- Trajectory 1: Status Quo Position: Malaysia's global competitiveness is expected to decline over time. In terms of ranking, Malaysia is expected to fall 18 places from 27 in 2019 to 46 by 2030.
- Trajectory 2: Enhanced STI Ecosystem: Malaysia's global competitiveness is expected to improve from the current position of 27 in 2019 to 18 in 2030.

Source for competitiveness ranks: World Economic Forum, Global Competitiveness Index
Source for STI calculation: World Economic Forum, Global Competitiveness Index; Department of Statistics Malaysia
Note: Actual data is obtained from 2007 to 2019. The 2020 to 2030 projections were calculated using the respective countries' compound annual growth rate from existing data. It is assumed that the growth rates will remain constant from 2020 and 2030 and final scores were projected, and ranks calculated accordingly. Using Malaysia's STI projections from, a subsequent linear regression analysis was added for the projected STI ecosystem index values and its impact on the WEF's global competitiveness index scores. Malaysia's competitiveness score was then projected using the regression formula with the modelled STI values from the two trajectories.

RECOMMENDATIONS

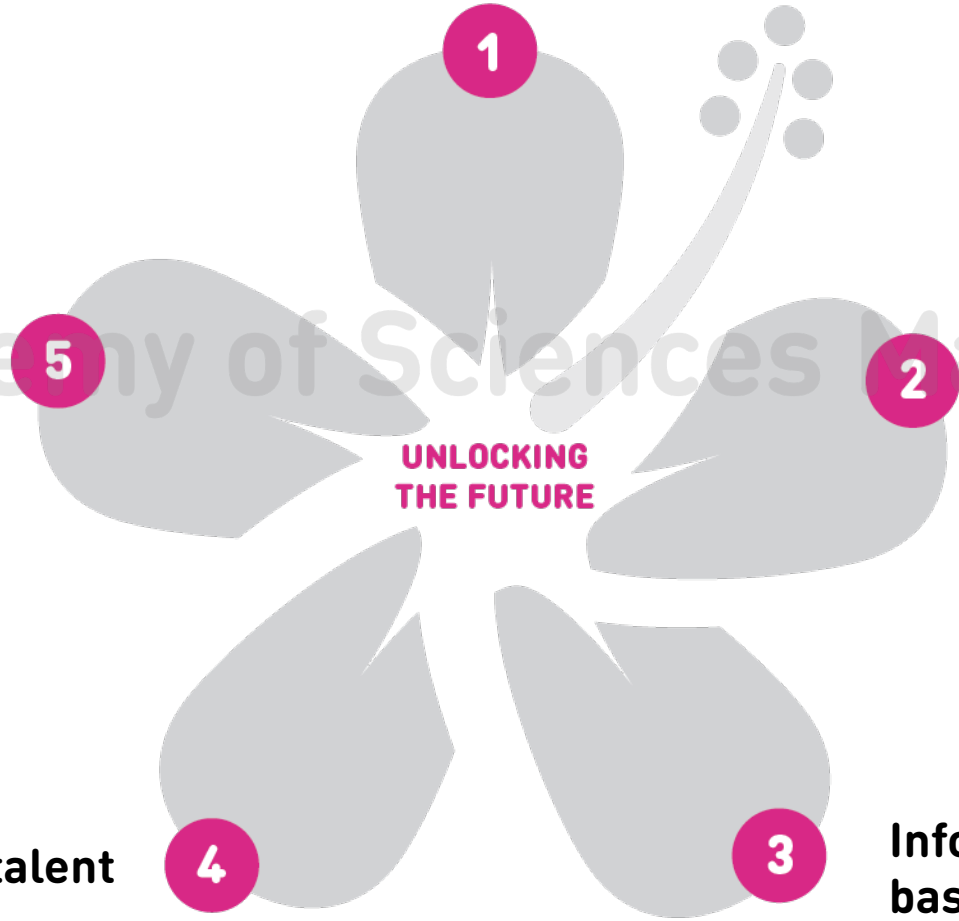
1 Strong & Integrated STI Ecosystem

2 Institutionalised Strategic Foresight

3 Infostructure as basic utility

4 Future-ready talent

5 Knowledge sharing & Strategic collaborations



UNLOCKING THE FUTURE

KNOWLEDGE PARADIGM IMPERATIVE

- Simple, linear models
- In-silo views
- Practice-based policies
- Knowledge transfer
- Performance driven
- By chance

- ✔ Non-linear participatory knowledge models
- ✔ Ecosystems approach
- ✔ Evidence-based policies
- ✔ Co-create knowledge hub
- ✔ Purpose and impact driven
- ✔ By design

THANK YOU