



Indonesia's Research Agenda and Strategy for Achieving Sustainable Production Landscapes and SDGs.

National Seminar on Sustainable upland production landscape:
Reflections for advancing agri-environmental policy in Indonesia
Bandung, 26 January 2023

PROFESIONAL
OPTIMIS
PRODUKTIF

INTRODUCTION

SUSTAINABLE LANDSCAPE : AN ISSUES

SUSTAINABLE LANDSCAPE

A sustainable landscape is global issue. It is a normative concept which means different thing to different people. This concept has harmonizing economic, social and enviroment mechanism and link to community belief, values and preferences (Opdam , 2018; Wu, 2012).

Landscape approaches render a scheme to contextualise adaptive co-management and effectively integrate policy and practice through iterative learning to balance multiple objectives in a given spatial area (Nishi and Yamazaki, 2020)

Landscape as a spatial entity

Landscape as a mental entity

Landscape as a temporal dimension

Landscape as a nexus of nature and culture

Landscape as a complex system

Sources: Tress and Tress (2001)

CONTEXT OF AGRICULTURAL LANDSCAPE

LANDSCAPE STRUCTURE

environmental features (e.g. habitats), land use types (e.g. crops), and man-made objects or cultural features (e.g. hedges)

LANDSCAPE FUNCTION

a place to live, work, visit, and provide various environmental services

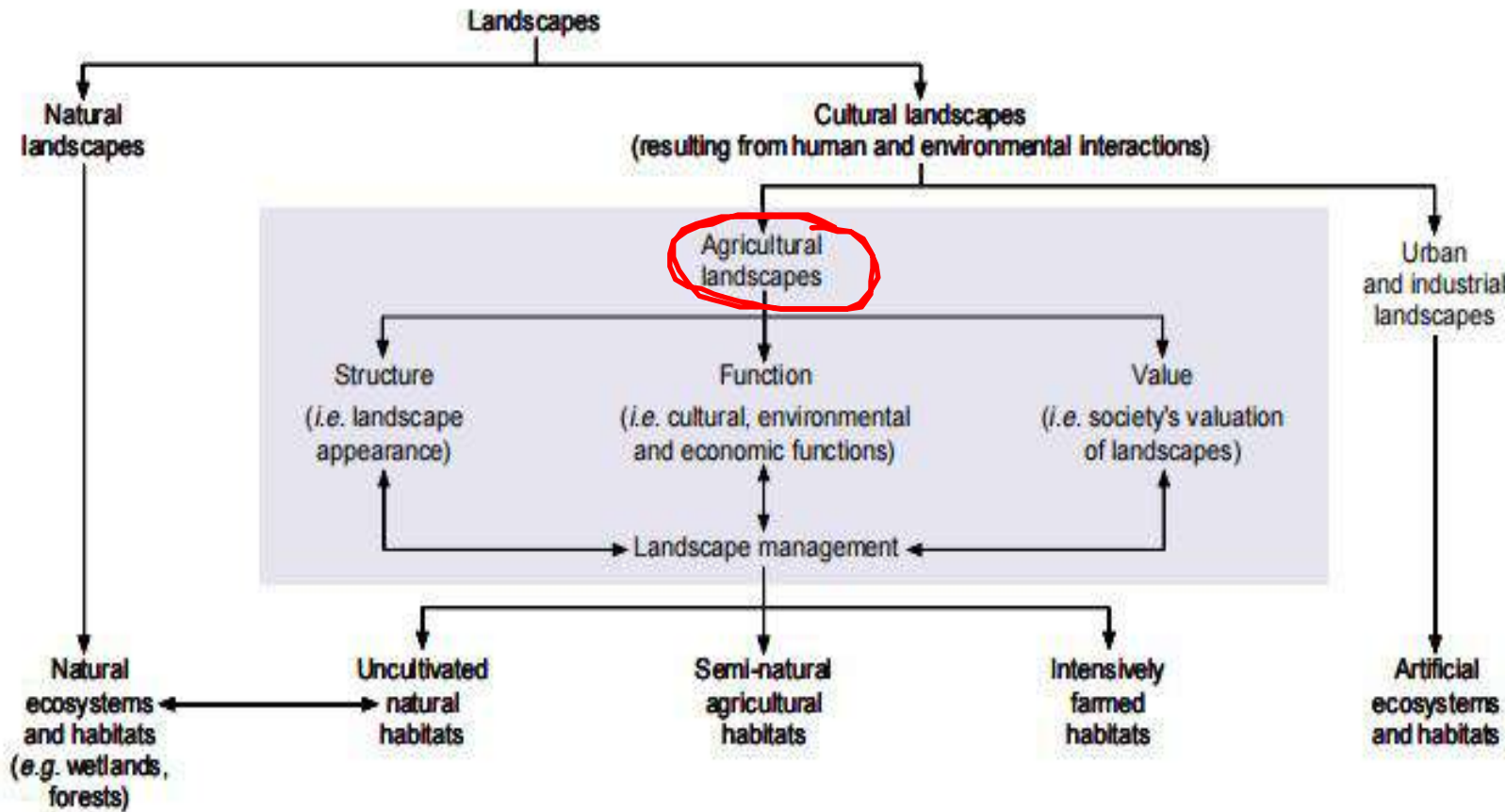
LANDSCAPE VALUE

Concerning the costs to farmers of maintaining landscapes and the value society places on agricultural landscape, such as recreational and cultural values



INTRODUCTION

SUSTAINABLE LANDSCAPE : AN ISSUES



General trend on sustainable production landscape

- 1) Landscape related to production and consumer expenditure
- 2) Homogeneity of landscape structure, which relate to the structural changes and intensification of production,
- 3) Public and private schemes for the conservation of agricultural landscape.
- 4) Cost incurred by farmers in landscape improvement.
- 5) science should give insight about how local decisions are connected to regional and global drivers and effects
- 6) Scaling up agriculture through multi-stakeholder landscape strategies

Sources; OECD, 2001



Sustainable Production Landscape

Multiple Target SDG and Potential Tradeoff

The Essential of SUSTAINABLE LANDSCAPE MANAGEMENT for Indonesia



As indicated by production index, Horticultural production is the leading sub sector followed by the estate crop. *However*, horticulture (vegetables) is the highest contributor to food loss (31,8% from the total domestic food loss).



Sources: Statistic Indonesia, 2021

1

understanding local land-use trajectories, histories, and traditions

2

upscaling agroforestry for landscape-scale benefits (Green Growth Agriculture)

3

fostering inclusive forms of landscape governance

4

supporting the research and innovation process of sustainable agriculture system analysis and design

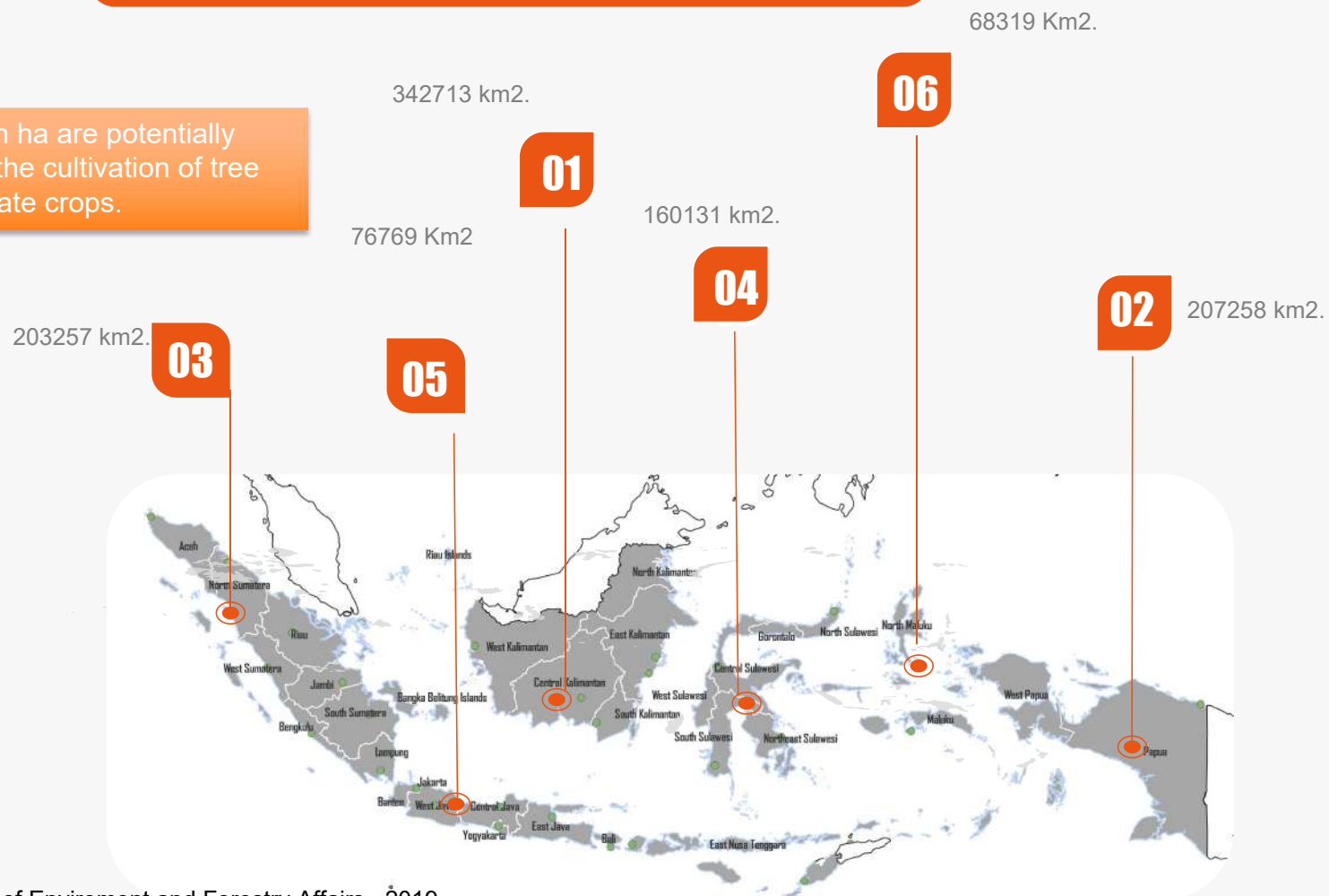


AGRICULTURAL LANDSCAPE

UPLAND PRODUCTION LANDSCAPE

Potential Upland Agriculture based on Islands

15-20 million ha are potentially suitable for the cultivation of tree crops or estate crops.



Sources: Ministry of Environment and Forestry Affairs , 2019

Characteristics

[1] Utilize slash and burn farming system for upland rice crops (South Sulawes) (Kikuta et.al, 2020)

[2] A high-risk activity which needs a high level of inputs to overcome the physical constraints, including a lot of labor (JS Adiningsih, 2021)

[3] Upland agriculture is predominantly rainfed

[4] Lower productivity compare to lowland crops

[5] most of Less Favoured Areas (LFA) boundaries have been used to define an "upland" farm

[6] Divers planting pattern and preferences

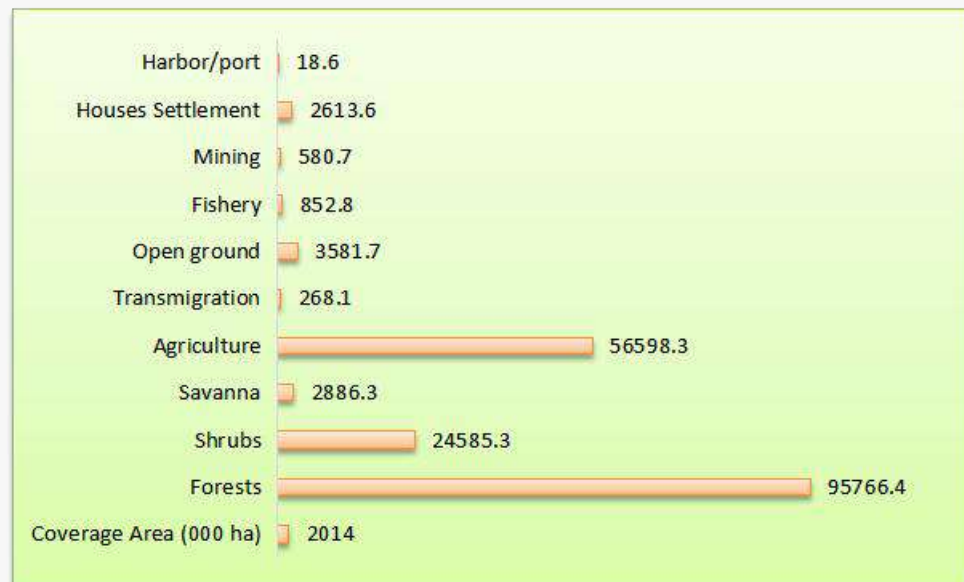
[7] Cultivate traditional rice varieties, but potential for other horticulture which require good drainage.

[8] Food crops that are grown mostly for home consumption with limited market surplus

LAND USE CHANGE

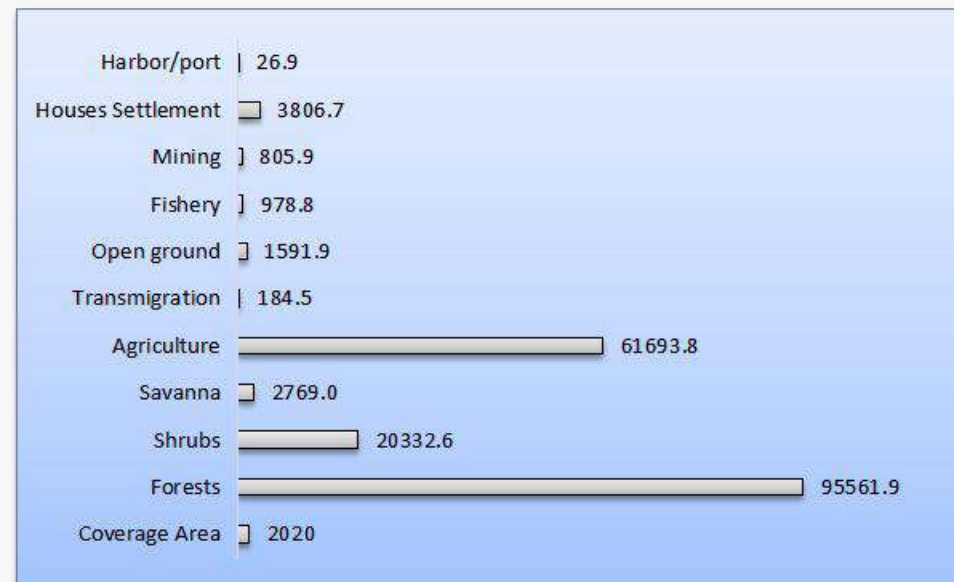
Indonesian Land Cover Area Inside and Outside Forest Areas 2014-2020 (000 of Ha)

2014



VS

2020



Forest area (50%) occupy the largest share of the total land cover area followed by agricultural land (30%). It plays a key role to biodiversity which is highly dependent on land use.

Land cover change for forest and agriculture was driven by the expansion of oil palm plantation and other underlying determinan such as economic, social, politic, and institutional aspect.

Sources: National Statistic, 2021



AGRICULTURAL LANDSCAPE

UPLAND PRODUCTION LANDSCAPE: A NOTE

- 1 The accomplishment of agriculture development through intensification program for lowland rice, concentrated in area with good irrigation system, but for upland farming has just begin in the early 2000.
- 2 Favourable upland area provides regular sources of water, which can be used for irrigation of crops. However, most of upland has common problems that are erosion and water shortage, low soil fertility and productivity.
- 3 Without proper management, upland (Less Favoured Area) has potentially to be sites of poverty, hunger, hopeless, discontent, greediness and exploitation (Laquihon et. 1992; Ranaweera, 1993)
- 4 Environmental impact of agricultural practices can be found in some aspect of soil quality, water quality, land conservation, greenhouse gases, biodiversity, wildlife habitats and landscape.
- 5 Promoting integrated farming based on perennial crops and livestock in upland area. Grasses and legumes can stabilize upland slope for agriculture as well as provide fodder for cattle and small ruminants.
- 6 Extending the formal and non-formal types of governing with a market-based mechanism to allow a better use of local knowledge, more effective social learning, and more responsibility during implementation of socio-ecological transformation in upland area.
- 7 Reducing poverty and enhancing food security in upland areas in Indonesia through boosting agriculture productivity should be part of priority agenda for government policy as well as research initiative.



07

RESEARCH AND INNOVATION

Challenges to improve quality of upland production landscape

Climate change

Unpredictable extreme weather that causes floods and droughts has resulted significant damaged, and need proper adapation strategy to deal with the negative impact of climate change .

Land conversion

Paddy fields were converted at around 110,160 ha/year, of which around 75% of Java rice fields have shifted to housing and other facilities.

water resource depletion

Growing competition for scarce water resources both between agriculture and other users.

Land degradation

Poor resource management are often causes the nutrients removed in crops are not returned to the soil.

limited access to credit

Family business, high risk investment, low asset guarantee are particular reasons for farmer in LFA to obtain credit from formal financial institution

Research and innovation

Limited number of research funding to support sustainable upland production. As such an innovation need lag of time

Technology for input production

Low improvements and adoption in technology and farm management practices have led to a reduction in the use of these inputs per unit volume of production.

shortage of labor

Low quality of labor that cause low productivity remain an obstacle to improve agriculture production in the sake of digital ad milenial farming.

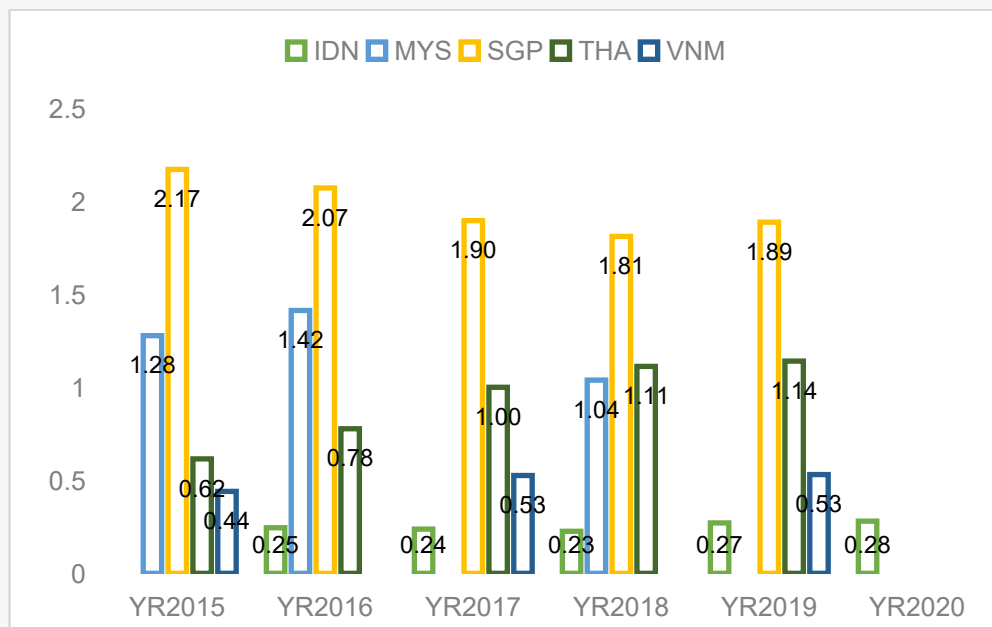




RESEARCH AND INNOVATION

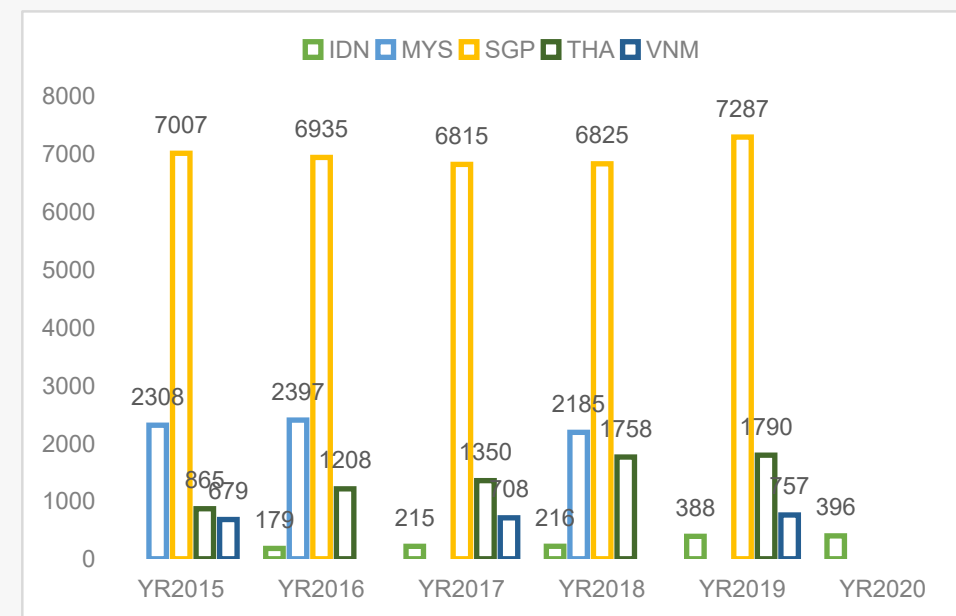
Research Expenditure and Number of Researcher

Research Expenditure as % of GDP 2015 - 2020



VS

Researchers in R&D (per million people)



Compare to other ASEAN countries, Indonesia's research expenditure as percentage of GDP place in the lowest rank in the last five years.

Number of researcher in Indonesia remains low compare to other ASEAN countries. only 396 researcher per 1 million people in 2022.

Sources: World Bank, 2022



R & D Priority Agenda

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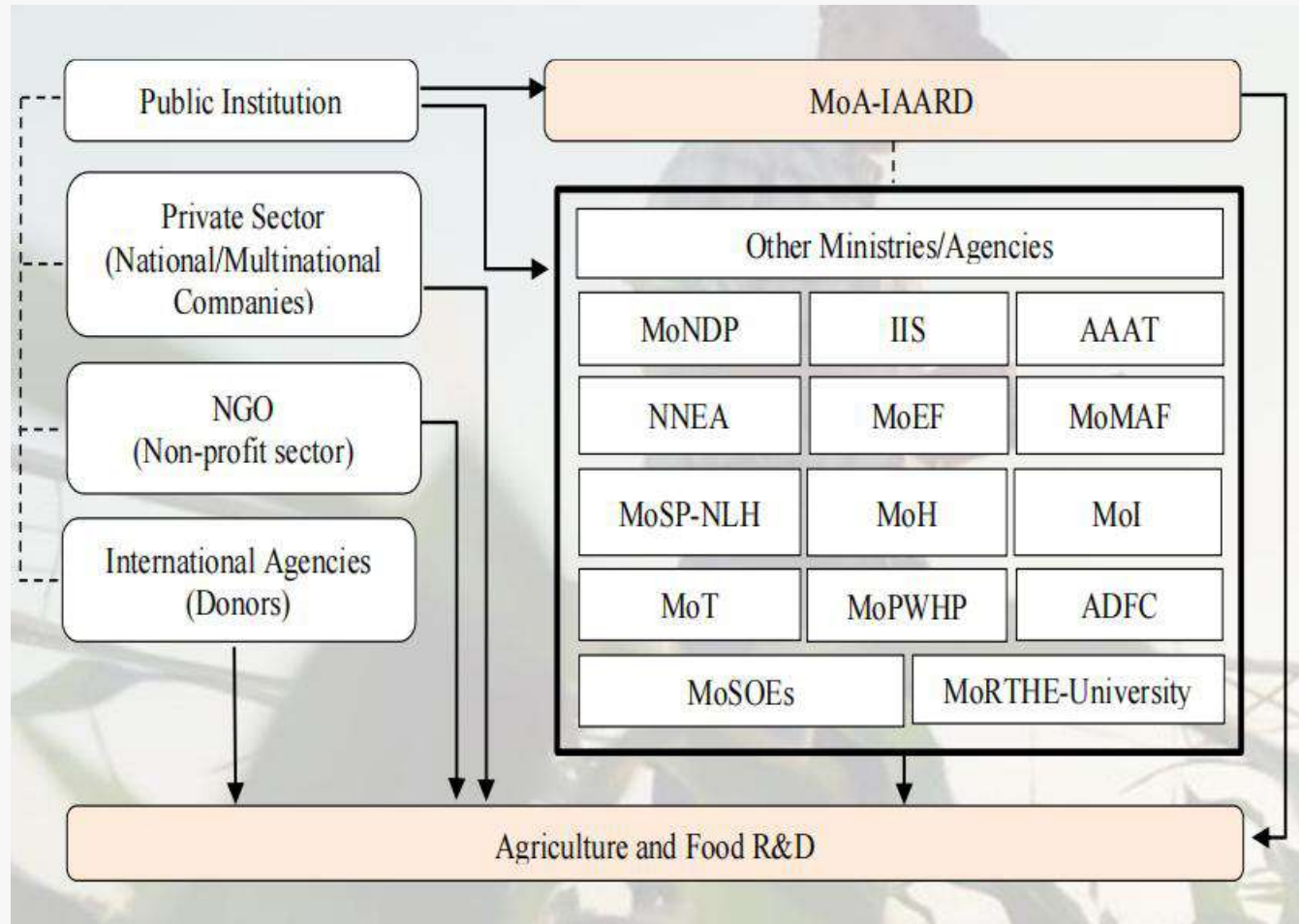
Research Topic	Supporting Budget	Institution
Planted breeding technology		
Utilizing radiation techniques for superior mutant strain	NNEA	MoA (IAARD), NNEA
Applying plant breeding-based biotechnology	MoA (IAARD), NNEA	MoA (IAARD), NNEA
Using conventional plant breeding	MoA (IAARD)	MoA (IAARD), MoEF, IIS
Cultivation and sub-optimal land use technologies		
Using wet sub-optimal land farming	MoA (IAARD), MoEF, AAAT	MoA (IAARD), MoEF, IIS, AAAT, Universities
Practicing potential dry lowland plants as a food source	IIS	MoA (IAARD), MoEF, IIS, Universities
Optimizing tropical farming systems	MoA (IAARD), IIS, AAAT	MoA (IAARD), MoEF, IIS, Universities
Postharvest technology		
Strengthening agroindustry-based local resources	MoA (IAARD), IIS, AAAT	MoA (IAARD), MoI, MoEF, MoSP-NLH, IIS, AAAT, Universities
Applying agricultural product preservation-based irradiation technology	NNEA	MoA (IAARD), NNEA, Universities
Diversifying and downstreaming food crops, estate crops, livestock, and fishery	MoA (IAARD), MoEF, MoMAF, MoI, IIS, AAAT	MoA (IAARD), MoEF, MoMAF, MoI, IIS, AAAT, Universities
Food security and self-sufficiency technologies		
Supporting self-sufficiency for food crops (rice, maize, and soybeans) and estate crops	MoA (IAARD), MoEF, IIS, AAAT	MoA (IAARD), MoEF, MoSP-NLH, IIS, AAAT, ADFC, Universities
Accomplishing food independence of ruminant commodities	MoA (IAARD), NNEA, IIS, AAAT,	MoA (IAARD), NNEA, IIS, AAAT, ADFC, Universities
Achieving food independence for aquatic commodities	MoMAF, MoEF, MoI, IIS, AAAT	MoMAF, MoEF, MoI, IIS, AAAT, ADFC
Generating efficiency of food crops, estate crops, livestock and fishery commodity value	MoA (IAARD), MoMAF, IIS	MoA (IAARD), MoMAF, AAAT, ADFC, MoI, MoT, Universities

National Budget for R&D for food and agriculture

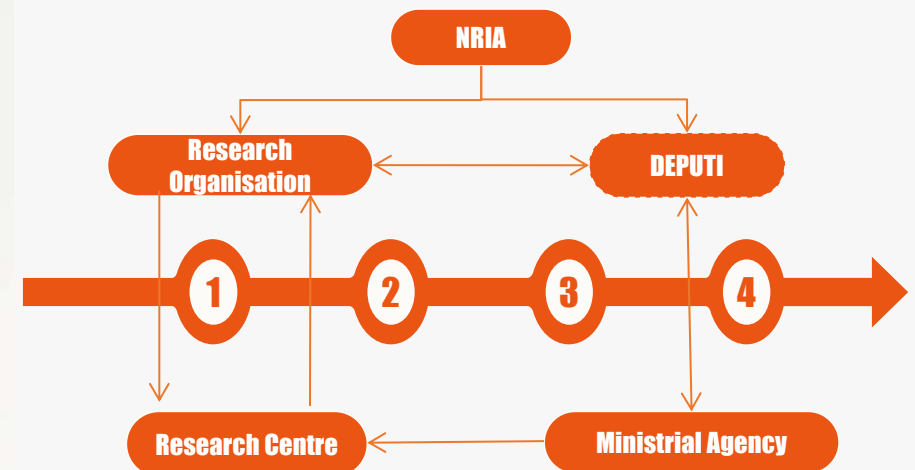
Year	Budget (million USD)	Growth (%)
2010	171.59	
2011	196.95	14.78
2012	182.51	-7.33
2013	194.77	6.71
2014	155.07	-20.38
2015	152.99	-1.34
2016	152.62	-0.24
2017	130.70	-14.36
2018	148.74	13.80
2019	132.64	-10.82
2020	71.38	-46.19
2021	89.30	25.10
Average	148.17	-3.66

Source: IAARD, 2021

R & D institution before merge into NRIA



Working relation between units under NRIA and Ministrial Agency (FKPRI)



Source: IAARD, 2020



NATIONAL RESEARCH AND INNOVATION AGENCY



BRIN is a special governmental body direct under President (not a ministry, nor non-ministerial governmental institution)

- Not under coordination of any ministries / coordinating ministries.
- Integrating all (human, infrastructure, budget) resources of 48 governmental research institutions across ministries and institutes.
- Implementation period: August 2021, and the full transformation into single entity of BRIN starting from 1 January 2022.
- Covering all research fields.
- BRIN is responsible for national STI policy and executing agency of research, while Kemdikbudristek is responsible only science activities within universities.



BRIN → Kemristek + 4 LPNK + 44 litbang K/L



National
Institute of
Aeronautics
and Space



Indonesia
Institute of
Sciences



Agency for the
Assessment and
Application of
Technology



National
Nuclear
Agency

BRIN is mandated to overcome drastically low critical mass of research resources in Indonesia to:

- Improve research capacity and competences, in particular in term of research infrastructures.
- Attract the young talents on research to join and to contribute in any research activities in Indonesia.
- Support global engagement and collaboration
→ speed up knowledge and skill transfer through research collaborations.
- Enable government as a facilitator / enabler for local business players to conduct R&D based product development with very low investment.

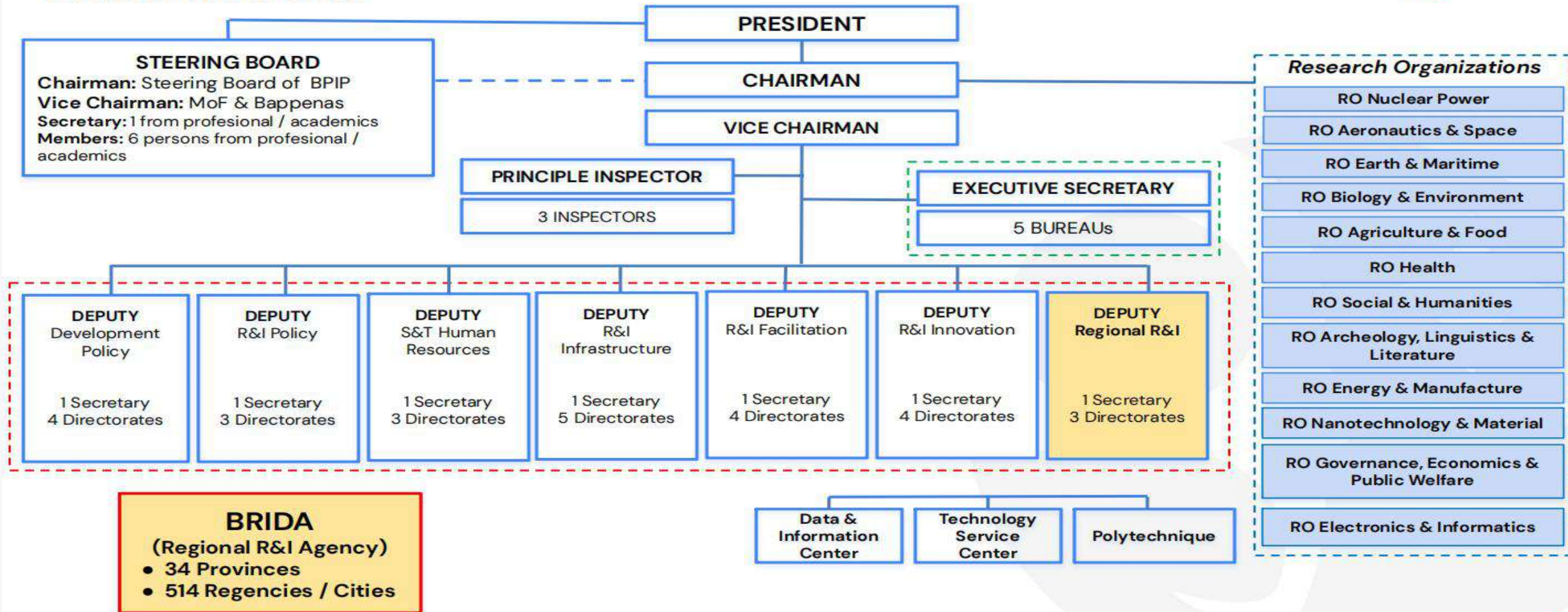
Constitution 11/2019 about National System for S&T

Constitution 21/2013 about Space

Constitution 25/2004 about National Development Planning System

Constitution 10/1997 about Nuclear

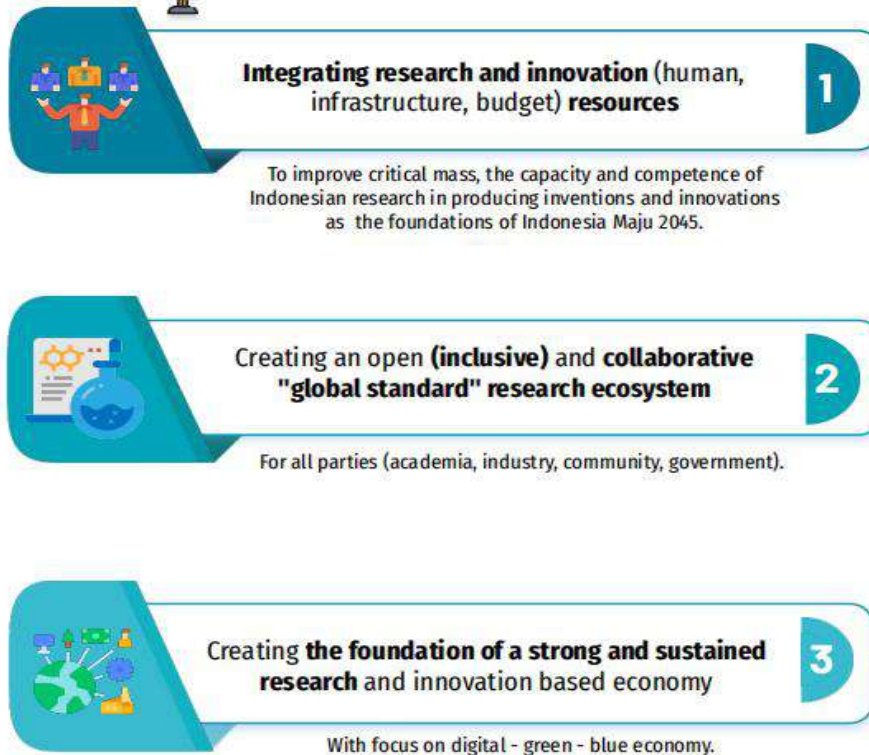
ORGANIZATION



3 DIRECTION & 7 TARGETS



Directions



Targets



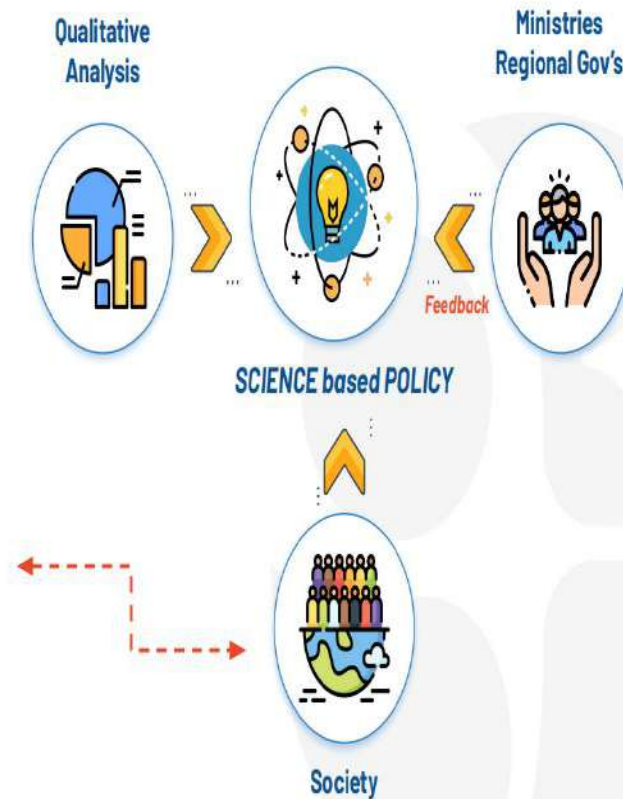
#1 STRENGTHENING EVIDENCE / SCIENCE-BASED POLICY



BRIN's FOCUS

Providing policy recommendation at national / sectoral / regional level based on research in the related area using:

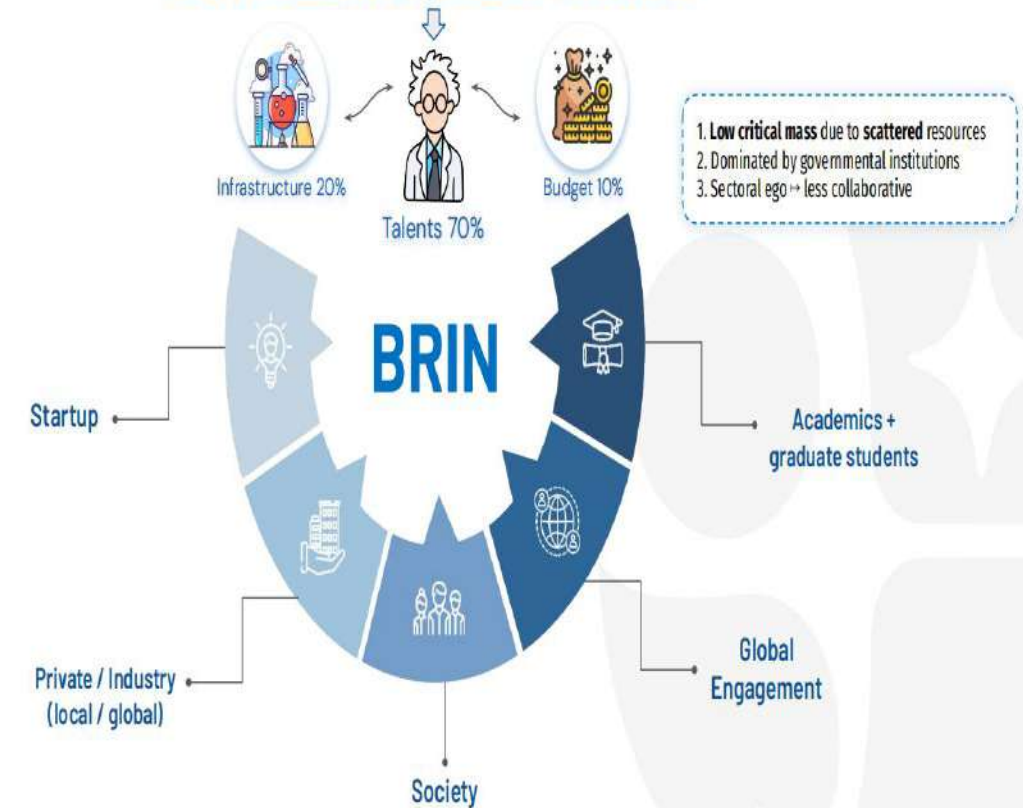
- Credible primary references,
- Data management and collection,
- Proper quantitative method,
- Accumulated knowledge asset,
- Scientific culture and ethics.



#2 STRENGTHENING ECOSYSTEM FOR R&I



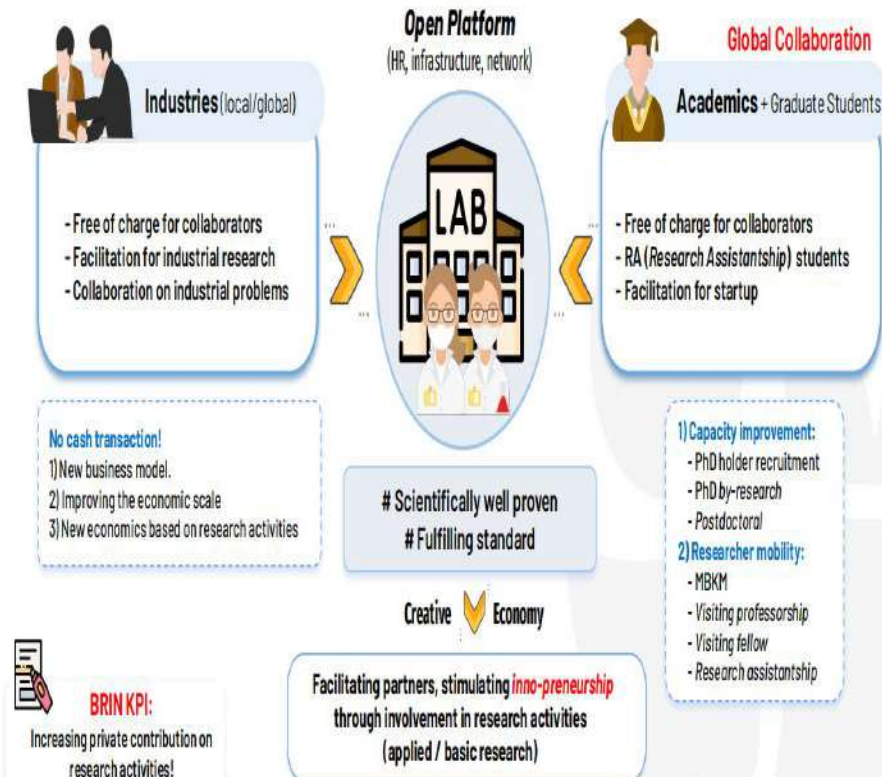
Every Rp of research budget generates 10x worth of output!



SCHEME #1: OPEN RESEARCH INFRASTRUCTURE

Ultimate solution for low critical mass → **collaboration hub + enabler**
Basic platform to encourage interaction and research dynamic

<http://elsa.brin.go.id>

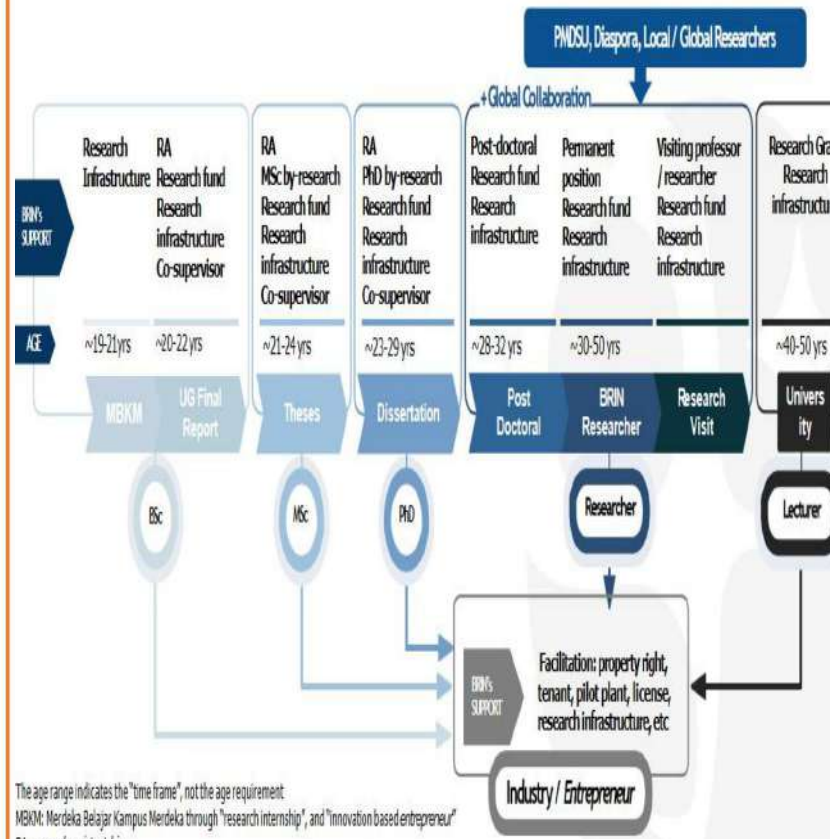


RESEARCH MOBILITY

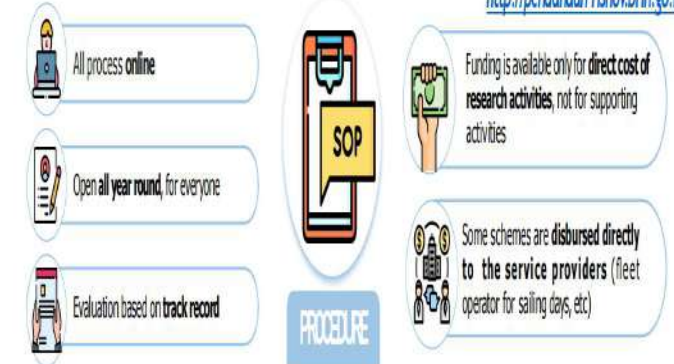
National Talent Management in R&I

Basic platform to improve researcher capacity and competence

<http://manajementalenta.brin.go.id>



R&I FACILITATION

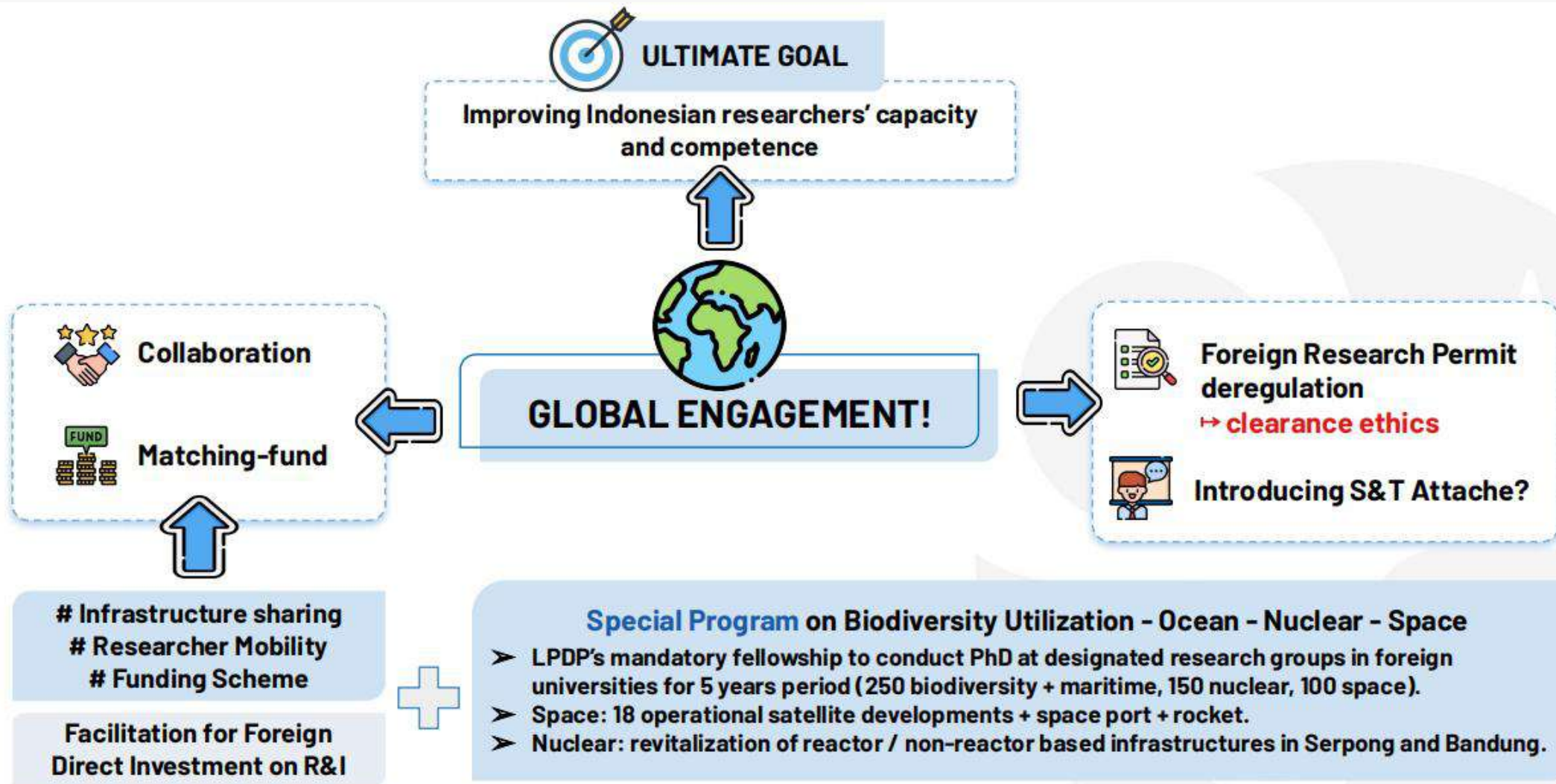


BASIC PRINCIPLE

- All schemes are open to the public regardless the affiliation in a competitive basis
- Only for designated research activities
- Funding sources come from state budget and endowment fund
- Administration is quite simple and less bureaucratic

SUB-ES

- Advanced Indonesia Research Grant
- Sailing Days Grant
- Startup
- COVID-19 Research Grant
- Innovation Products Trial Grant in Health
- Local Knowledge Acquisition
- Research Collaboration Center
- Innovation Products Testing Grant in Agriculture
- Expedition / exploration





THANK YOU



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