

SCIENCE & TECHNOLOGY NETWORK IN THE INNOVATION SYSTEM OF UP-STREAM OIL PALM INDUSTRY IN INDONESIA

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Oil Palm

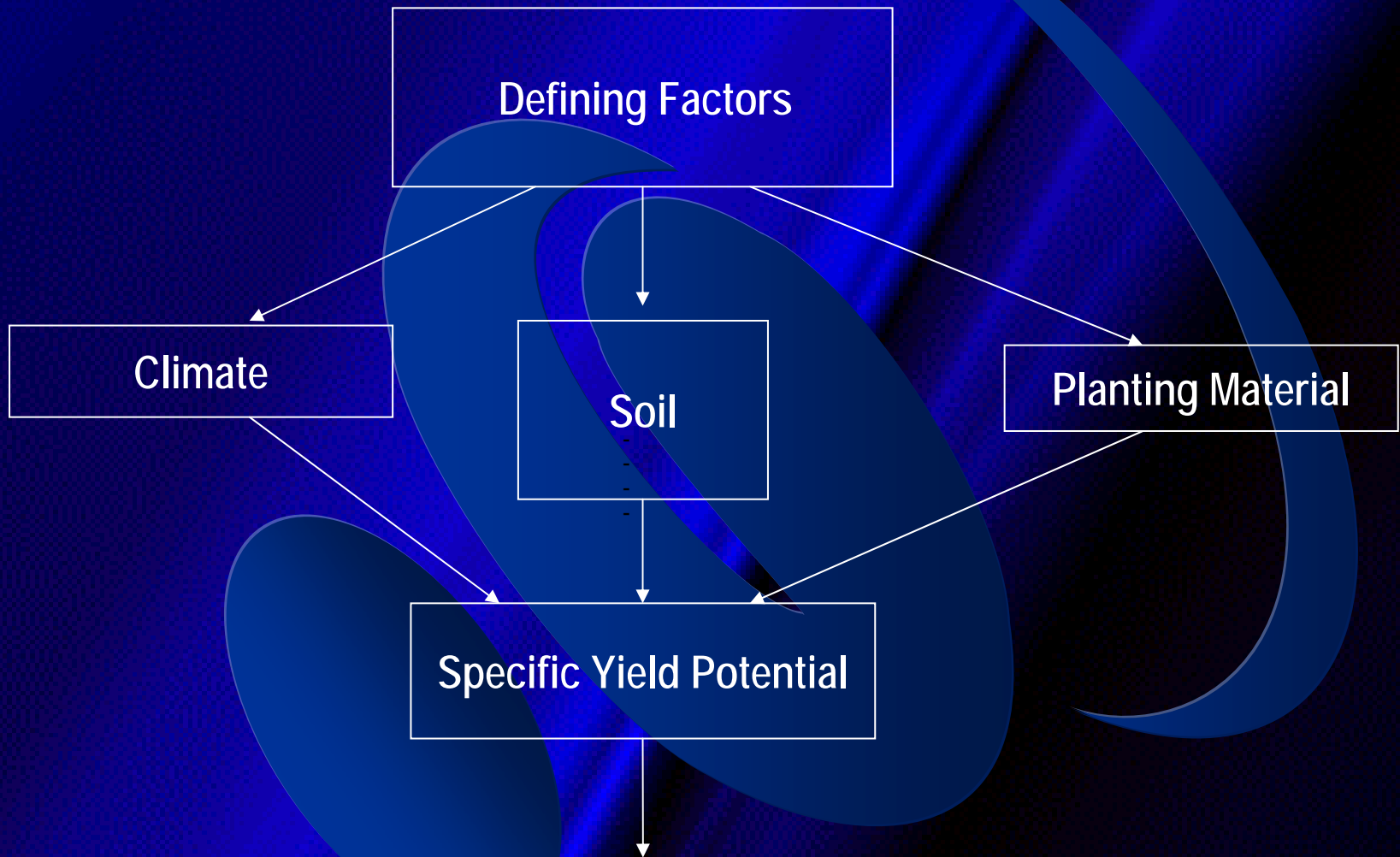
- Indonesia is the second largest palm oil producer country in the world.
- It is projected that Indonesia will become the largest palm oil producer in the world in 2008.
- Combined with Malaysia, the two countries have more than 85% of palm oil world market share.

Oil Palm

- Meets domestic demand on frying oil and margarine
- Most of palm oil is exported
- Oil palm data in 2005 :

Area (million ha)	Palm oil production (million MT)	Export volume (million MT)	Export value (US \$)	Employment (million)
5.6	13.8	10.3	4 billion	3

Yield and quality defining factors of palm oil



Source: Modified from PT. Astra Agro Lestari Tbk. 2006

Up-stream oil palm industry

- Sustainable provision of high quality oil palm planting material (seed) is one of the issues that need to be addressed with technological innovation.
- The growth of oil palm seed demand is mainly due to a rapid expansion of the size of the oil palm plantation.

The term of up-stream oil palm industry in this case is limited to oil palm seed industry.

This presentation

- Highlights Indonesian policies impacting industries,
- Briefly describes some innovation challenges in the oil palm seed industry,
- Provides an excerpt from a survey on science and technology network in upstream oil palm industry.

Some policies related to S & T and innovation in Indonesia 1988-present

Fiscal Incentive:

Import duty exemption (in attempts to support the so-called national car program/mobnas)

Tax deduction:

Income from training and development of human resources for R&D institutes,
income from procurement of goods and services for R&D institutes

Financial Incentives:

Grants on various schemes from MOST involving public research institutes,
universities, and private sectors

Venture Capital (PNM, Artha Bahana Ventura)

Administrative Instruments:

Law on Anti Trust (Law No. 5/1999)

Law on Research, Dev't, and Application S&T (Law No. 28/2002)

Laws on Intellectual Property Rights (Trade secret, Patent, Trade Mark, Copyright,
Design Integrated Circuit Layout, Industry Design)

Gov't Regulation on Transfer of Technology (Government Regulation No. 20/2005)

Gov't Regulation on Financial Management of Public Service Unit (Badan Layanan Umum/BLU)

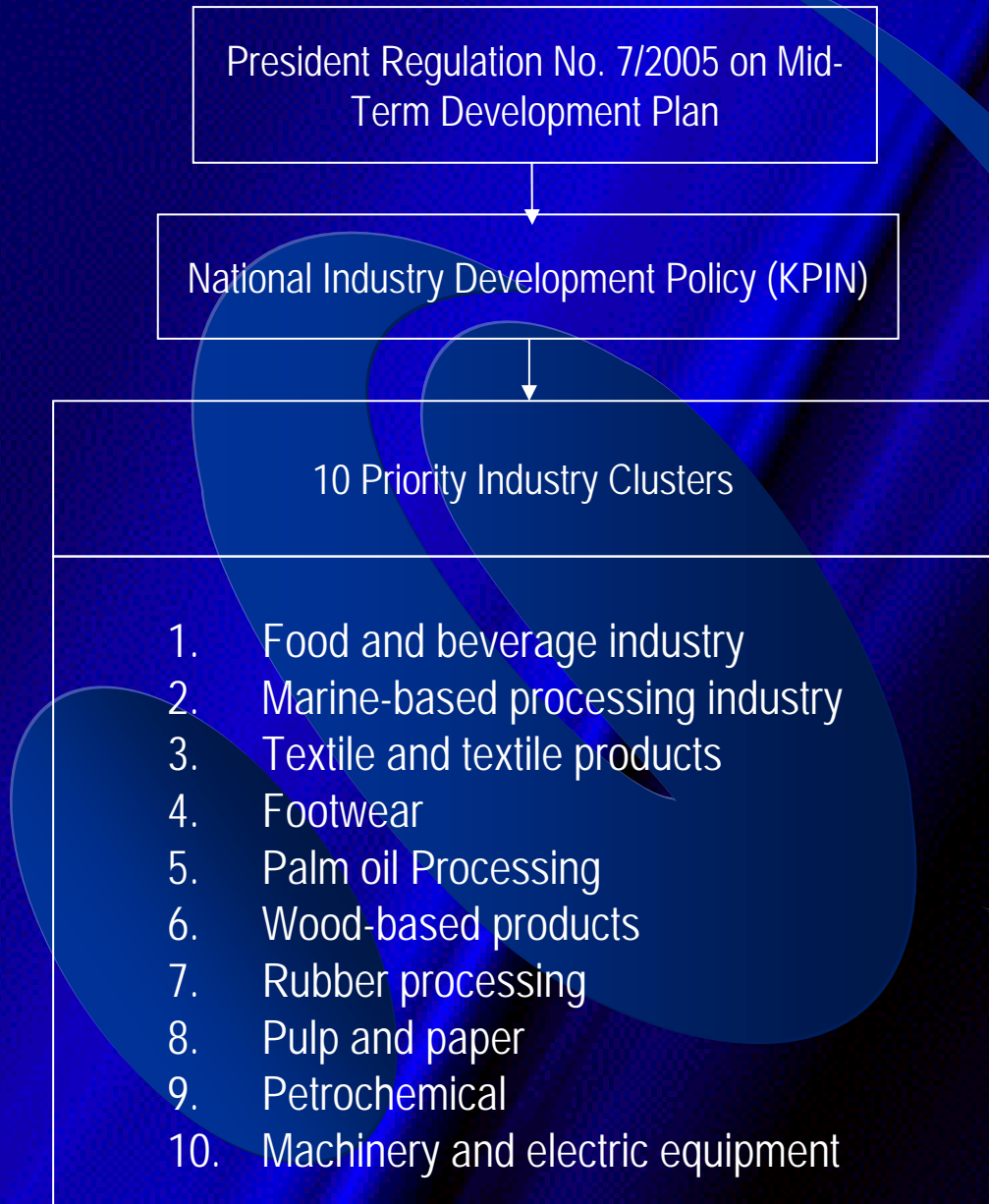
Source: Adapted from Aminullah, 2006

Related concepts and policies on innovation system and cluster

Category	Global Innovation System (GSI)	National Innovation System (NIS)	Subnational Innovation System (SIS)	Innovation Cluster
Focus	<ul style="list-style-type: none"> Global Innovation process Multinational company 	<ul style="list-style-type: none"> National level innovation process 	<ul style="list-style-type: none"> Subnational innovation process 	<ul style="list-style-type: none"> Clustering phenomenon Innovation process at specific area
Major Actors	<ul style="list-style-type: none"> Multinational company, many national innovation systems 	<ul style="list-style-type: none"> National/local government, university, industry, public research institute 	<ul style="list-style-type: none"> Local government, local university, local industry (SME), public research institute 	<ul style="list-style-type: none"> Industry, university, public research institute
Network/Structure	<ul style="list-style-type: none"> Global network 	<ul style="list-style-type: none"> National level network Being connected to GIS 	<ul style="list-style-type: none"> Local network Being connected to NIS and GIS 	<ul style="list-style-type: none"> Global/local network
Policy Objective	<ul style="list-style-type: none"> Integration of NIS into GIS 	<ul style="list-style-type: none"> National competitiveness 	<ul style="list-style-type: none"> Subnational (Regional) competitiveness 	<ul style="list-style-type: none"> Competitiveness of Clusters
Policy Direction	<ul style="list-style-type: none"> Utilization of global opportunities 	<ul style="list-style-type: none"> Promoting interaction among the actors S&T culture promotion R&D investment and management 	<ul style="list-style-type: none"> Involvement of local government More local contents into S&T policy 	<ul style="list-style-type: none"> Cluster establishment development

Source: Deok-Soon Yim in UN-ESCAP, 2007:34

Industry cluster development in Indonesia



Some challenges of up-stream

- Low productivity (oil yield)

Countries	Yield (ton/ha)
PNG	4.3
Malaysia	4.0
Colombia	3.8
Indonesia	3.0
Cote d'Ivoire	2.0

Source: Jacquemard, 2006

Some challenges of up-stream

- Production of high quality seeds is less than domestic demand (150 million seeds)
- Import of oil palm seeds (million) :

Year	New Guinea	Malaysia	Costa Rica	Total
2002	0	2.000.000	500.000	2.500.000
2003	3.000.000	1.177.000	2.320.000	6.497.000
2004	9.250.000	6.112.020	7.900.000	23.262.020
2005	8.000.000	26.110.350	3.400.000	37.510.350

Oil palm seed production (million)

No.	Producer	2005	2006*	2007*	2008*	2009*	2010*
1	PPKS	35	40	40	43	45	46
2	PT. Socfindo	25	30	30	30	30	30
3	PT. Lonsum	13	14	15	15	15	15
4	PT. Dami Mas	8	12	20	20	20	20
5	PT. Tunggal Y.	6	6	10	10	10	10
6	PT. Bina S.M	10	20	20	25	25	30
7	PT. Tania Selatan	-	3	3	3	3	3
	TOTAL	97	125	138	146	148	154

To improve the quality of oil palm seeds

- There is an urgent need to enhance local innovation capacity.
- Increase in R&D expenditure and enhancement of the interaction among various actors in the innovation system become urgent tasks of the central and local government that needs to be addressed in the short run.

Expected superior oil palm seeds

- High productivity (oil yield)
- *Ganoderma* resistant
- Soil and dry tolerant
- High carotene content
- High unsaturated fatty acids (e.g. oleat)
- Other required plant characteristics

Technology needed

- Conventional breeding (Backcrossing)
- Molecular biology
- Genetic engineering
- Tissue culture

S & T Network

- A study on the science and technology network in the innovation system of upstream oil palm industry revealed some important findings on the nature of S&T related to development of quality oil palm seeds by local industries.
- It was found that the local industries had low levels of interactions with other two main actors of innovation system in Indonesia. On the other hand, there was a case where they had a continuous and long term relationships with several overseas research institutes.

S & T Network focus

- Productivity improvement (oil yield)
- *Ganoderma* resistant
- Soil and dry tolerant
- Quality improvement of palm oil
- Desired plant characteristics

Level of interaction amongst three main oil palm seed producers in the last three years

Name of Main Producers	PA	PB	PC
PPKS (PA)	-	3	2
PT. Socfin Indonesia (PB)	3	-	3
PT. London Sumatera Indonesia, Tbk. (PC)	1	1	-

Description of research program at three main oil palm seed producers in Indonesia

Type of research program	Duration of the program in existence (years)		
	Producer A	Producer B	Producer C
Oil palm seeds resistant against Ganoderma and the like	3	3	4
Oil palm seeds resistant on dry condition...abiotic	4	3	3
Productivity improvement	4	4	4
Quality improvement of CPO content	4	3	2
Desired plant characteristics, e.g., height, etc.	4	4	4

Level of interaction between three main oil palm seed producers and other five producers in the last three years

Palm Oil Seed Producers	PA	PB	PC
PT. Dami Mas	2	0	0
PT. Tunggal Yunus Estate (Asian Agro Group)	2	0	0
PT. Raminah Sejahtera	NA	NA	NA
PT. Bina Sawit Makmur	2	1	0
PT. Tania Selatan	2	0	0

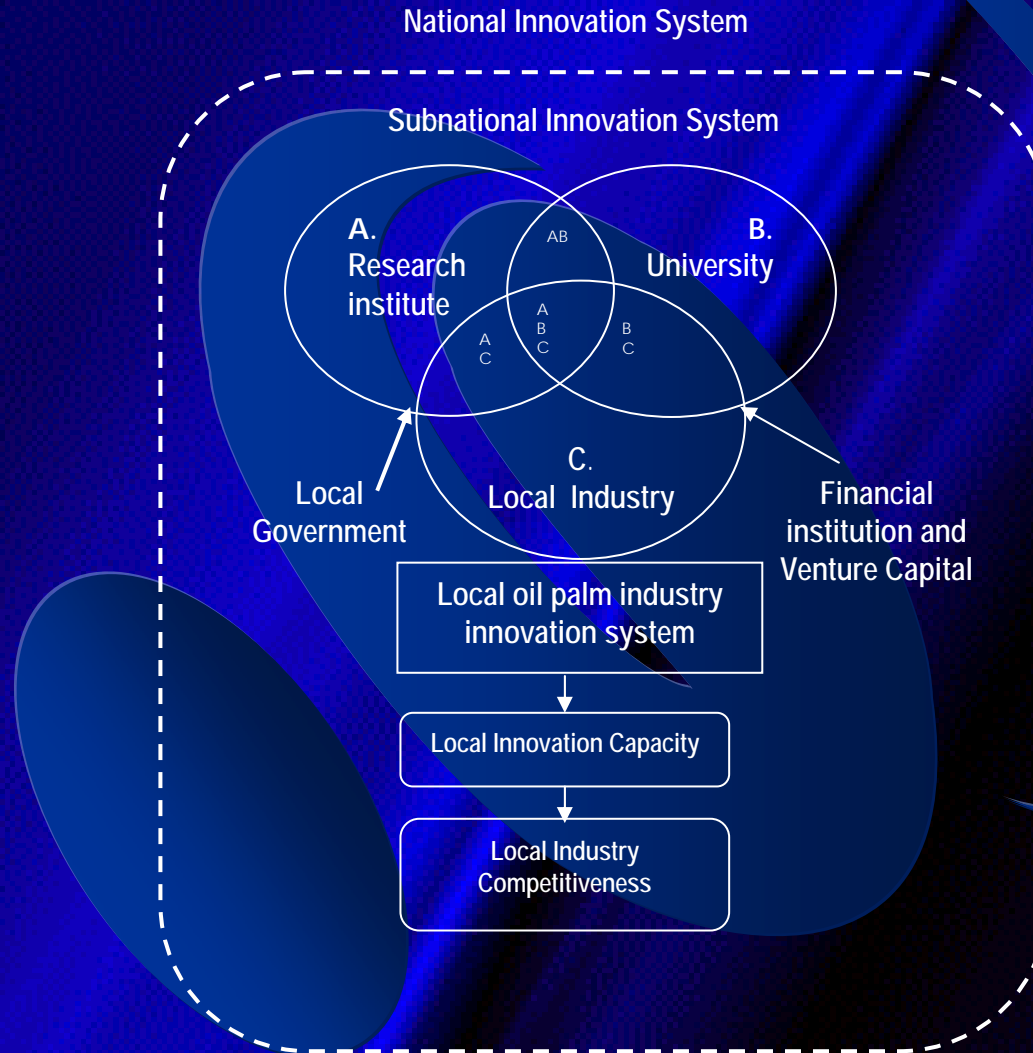
Level of interaction between main oil palm seed producers and research institute and selected universities in Indonesia in the last three years

Research Institute	Main Producers of Oil Palm Seeds ^[1]		
	Producer A	Producer B	Producer C
Bah Liah Research Station	2	3	-
Badan Litbang Pertanian (Agriculture R&D Agency)	3	2	0
Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumber Daya Genetik Pertanian Biogenetik (Center for Biotechnology and Agriculture Genetic Resources)	2	0	0
Badan Pengkajian dan Penerapan Teknologi (BPPT)	2	0	0
BIOTROP Southeast Asian Minister of Education Organization, Bogor, Indonesia	2	0	0
Lembaga Riset Perkebunan Indonesia (LRPI)	3	0	0
Lembaga Ilmu Pengetahuan Indonesia (LIPI)	1	0	0
Pusat Penelitian Kelapa Sawit—Oil Palm Research Institute (PPKS)	-	3	1
Balai Penelitian Bioteknologi Perkebunan	2	0	0
Pusat Penelitian Pengembangan Perkebunan	2	2	0
Balai Pengawasan dan Pengujian Mutu Benih Perkebunan	3	3	3
Balai Penelitian Bioteknologi Pertanian (Reserch Division for Biotechnological Agriculture)	2	0	0
Universities/Higher Educationn Institutes			
Bogor Agriculture Institute	2	0	0
North Sumatera University	2	0	0
Gajah Mada University	2	0	0
Sriwidjaja University	0	0	0
Bandung Institute of Technology	1	0	0

Level of interaction between three major oil palm seed producers and overseas institutions in the last three years

Research Institute	Main Producers of Oil Palm Seeds		
	Producer A	Producer B	Producer C
Centre de coopération Internationale en Recherche Agronomique pour le Développement, Perancis (CIRAD)	2	3	3
International Society of Oil Palm Breeding (ISPOB)	2	2	0
International Society of Oil Palm Agronomist (ISOPA)	1	1	0
Biotechnology Industry Organization (BIO)	1	0	0
Nigerian Oil Palm Research Institute (INFOR)	1	0	0
The Potash and Phosphate Institute and the Potash and Phosphate Institute of Canada (PPI-PPIC)	2	2	1
Fondation for Agronomic Research (FAR)	0	1	0
Incorporated Society of Planters (ISP)	1	1	0
Centro Internacional de Agricultura Tropical (CIAT), Colombia	1	1	0
Malaysian Palm Oil Board (MPOB, Malaysia)	3	1	0
Felda Agriculture Service Sdn. Bhd. (FASSB Estate), Malaysia	1	0	0
Kumpulan Guthrie Sdn. Bhd., Malaysia	1	0	0
Dami Oil palm Research Station (DORS)	1	0	2
Pacific Rim Palm Oil Ltd (PRPOL), Singapore	0	1	1

Subnational Innovation System and local industry competitiveness



Results of S&T Network

- As the result of this long term collaboration, currently the oil yield per hectare has increased 42% since the use of Recurrent Reciprocal Scheme in attempts to improve the quality of oil palm seed.
- Collaboration between PT. Socfindo and CIRAD has also been expanded by involving PT. Lonsum Tbk especially in R&D related to resistance improvement of oil palm seed against *Ganoderma boninense*.
- In the next 20 years, the cooperation has set a challenging R&D target, i.e., to develop oil palm seed that reach oil yield 8 – 9 ton/ha per year.

Conclusions

- The development of high quality oil palm seeds has been undergoing for a long time. Interaction between local actors and overseas actors for a long period of time has produced significant results in the development of high quality oil palm seeds.
- There is an urgent need to local government to develop subnational innovation policies so as to stimulate intensive interactions among the various actors of innovation system.

Conclusions

- Such policies has to entail a long perspective and continuous commitment in its implementation at the local level. This ensures that innovation system development will consistently be implemented.

Thank You