Challenges in Implementing Sustainable Development Policies in Indonesia:

Lessons from the Integrated Pest Management Program in 1980s & 1990s

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Sustainable Development: Short History

- 1962 Silent Spring by Rachel Carson led to development of **grass root environmentalism.**
- 1972 UN Stockholm Conference on the Human Environment.
  - Introduce the needs to balance human development and environment: sustainable development.
  - NGOs played a leading role.
  - Developing countries was curious but suspicious.
- 1980 Report on World Conservation Strategy – Living Resource Conservation for Sustainable Development by IUCN, WWF, UNEP → strengthen arguments for global sustainable development.
- 1987 Our Common Future, The World Commission on Environment and Development, Oxford University.
  - Introduce formal definition of sustainable development:
    "to ensure that we meet the needs of our generation without compromising the ability of future generation to meet their own needs."
- 1992 Rio de Janeiro: UN Conference on Environment and Development.
  - Established the Agenda 21 to achieve Sustainable Development.

Sustainable Development: Short History

- 2002 Johannesburg: UN World Summit on Sustainable Development.
  - Johannesburg Declaration and Final Report.
- 2012 Rio de Janeiro: UN Conference on Sustainable Development.
- 2015 UN Sustainable Development Submit.
  - Produce the 17 Sustainable Development Goals and the associated 169 targets.

Principles of Sustainable Development

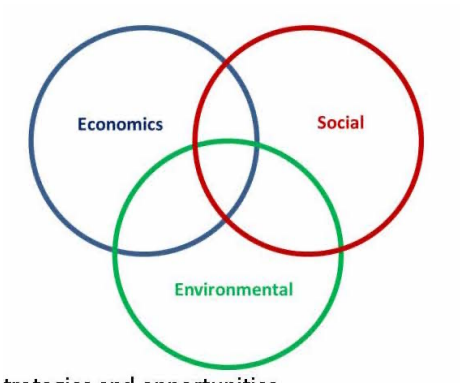
- **Sustainability**: … without compromising the ability of future generation to meet their own needs.
- Involving the concept of **capital:**
  - natural capital
  - human-made capital
  - human capital
  - social capital.
- Strong and Weak sustainability:
  - Strong: existing natural capital must be maintained and developed
  - Weak: human-made capital of equal value take the place of natural capital
- Approach to achieve sustainability: Predict the need of future generation, then typical actions needed are to control:
  - the use of materials from the earth's crust
  - physical degradation of nature, including pollution

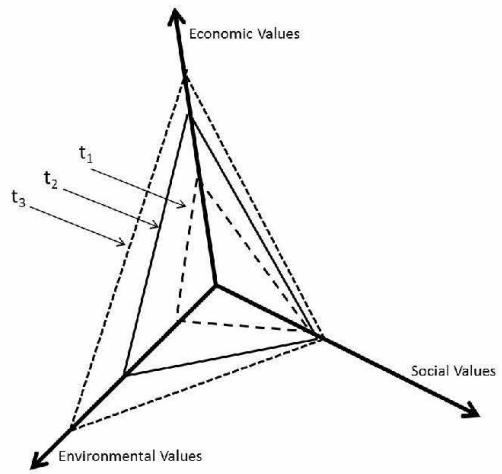
  and stimulate people's ability to meet their basic needs.

Principles of Sustainable Development

- **Triple Bottom Lines**: is an accounting framework taking into account 3 dimensions of performance: economic, social and environment (Elkington, 1994; Munasinghe, 1993).
- The triple bottom lines are about**:**
  - Economic growth: economic bottom line
  - People welfare: social equity bottom line
  - The earth, environment bottom line.

} Development





Rice Cultivation during Colonialization Era

- People in the archipelagos, particularly in Java, Sumatra and Sulawesi have been cultivating rice for a long time, even before the colonialization era. Productivity, however, was suspected to be stagnant for a while before the colonialization (Geertz, 1963)
- The Dutch colonial government have made some attempts to improve peasant rice cultivations in Java since mid 1700s, by constructing "Western" irrigation system in Java (Soen, 1968). Mostly, the government was care in the development of estate crops (implementation of Cultural System was an example).
- Significant efforts to improve rice productivities in the archipelagos, however, would most likely begin in the early 1900s, when the colonial government started to implement their "Ethical Policies".
- First, they built major irrigation systems in Java as well as some parts of Sumatra and Sulawesi. In Java and Madura, total wet-rice area increased from approximately 2.7 million ha in 1900 to approximately 3.38 million ha by 1940 (Soen, 1968).
- Second, they established the Department of Agriculture in 1903 aiming to improve productivities of indigenous agriculture. In 1911, this department started creating agricultural extension services to provide technical knowledge to indigenous peasants (Koens, 1956) and government agricultural experimental stations. This could probably mark the beginning of rice cultivation research in Indonesia.
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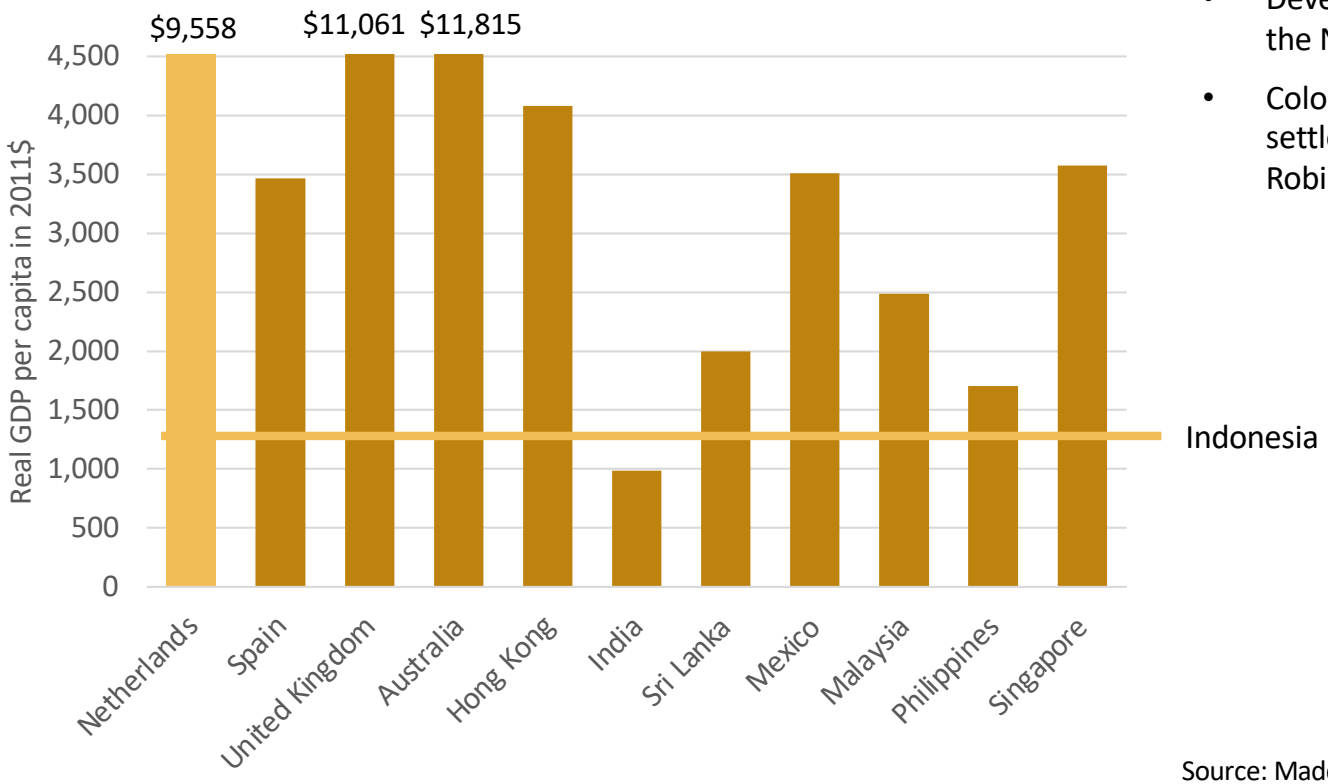
GDP per Capita: 1950



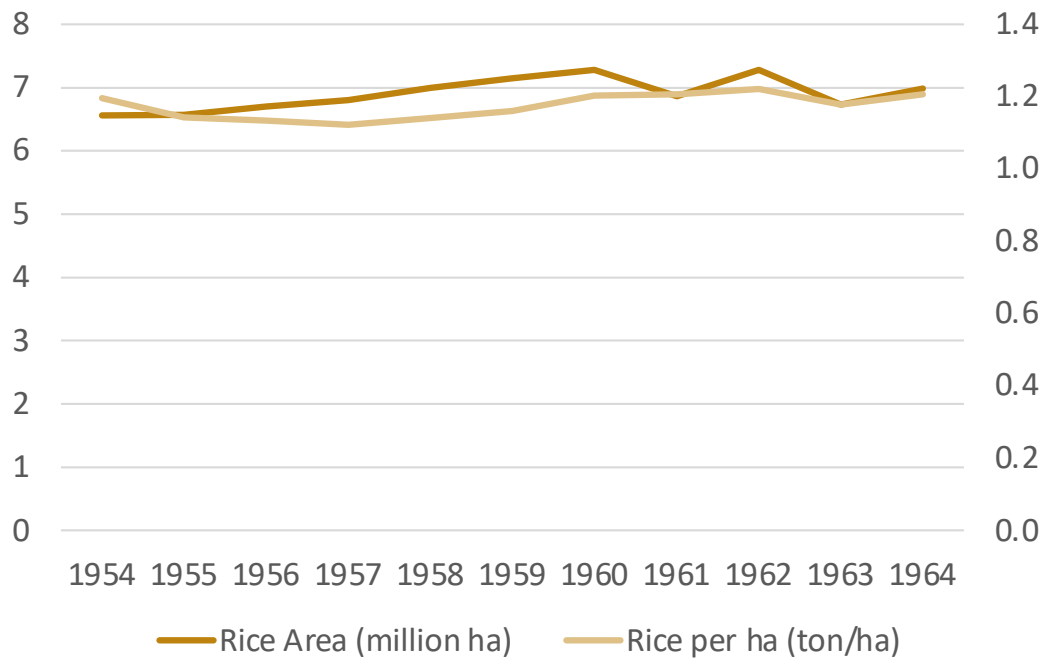
- Development gap between Indonesia and the Netherlands was huge.
- Colonies for resource extraction or for settlement does matter (Acemoglu & Robinson, 2013).

Source: Maddison Project Database (MPD) 2020

Old Order Period

- Period of contested policies and governmental systems as well as rebellion movements; some times not that clear.
- The economy was in general stagnated or declined.
- Resource extractions were limited.
- Early period of transmigration.
- Rice expansion and production were relatively stagnated as well.
- A period of serious food deficiency in Java in the early 1960s.
- Widodo and Resosudarmo (forthcoming) argue that this food shortage induces lower educational achievement, lower cognitive capacity, and stunting among those born between 1960 till 1965 in Java compared to their counterparts born in different periods.

Rice Area and Productivity



- Stagnation of rice productivity encouraged an establishment of *Padi Sentra* program in 1959; backing up with left over Dutch agricultural facilities.
- The program was considered unsuccessful due inability in engaging in a large-scale program (Roekasah & Penny, 1967).
- Administrative breakthrough: IPB's Action Research (1963) and DEMAS (1964)
  - +/- 440 students were sent to +/- 220 villages
  - *Panca Usaha*
    - HYVs: Arimbi, Dara and Shinta
    - Fertilizers
    - Pest management
    - Cultivation method
    - Irrigation (Fox, 1993)
  - Initiated the green revolution in Indonesia.

Source: Mears and Moeljono (1981)

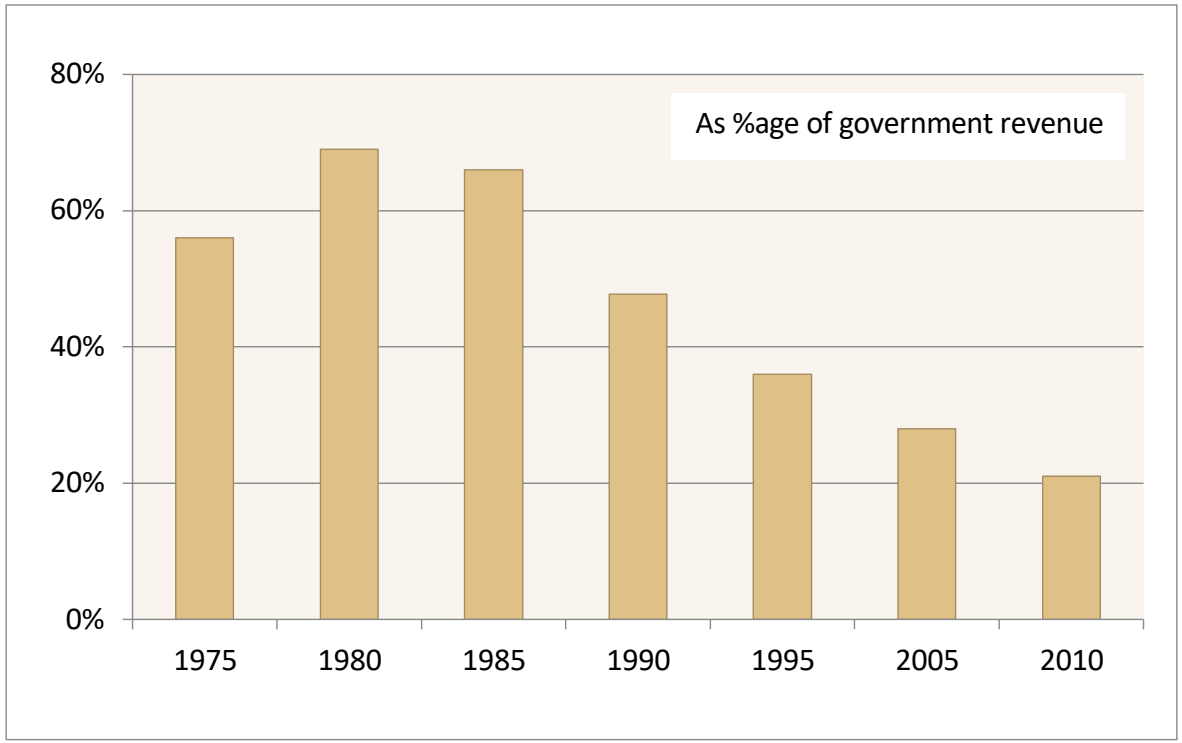
New Order Era: Green Revolution

- Considered successful → BIMAS by MoA in 1965. which was involving +/- 1,400 students.
- Strong commitment by the president to support further development of BIMAS.
- BIMAS Gotong Royong in 1968: Involvement of some private companies to supply fertilizers and pesticides →declined effectiveness of BIMAS.
- Improved BIMAS in early 1970s: BRI, any private companies and funded by the bonanza oil revenues during that period.
  - Major irrigation projects were implemented.
  - Increased number of extension workers replacing students.
  - Distributed HYVs pest-resistant (IR26, IR28, IR30 and IR34).
  - Subsidizing fertilizers and pesticides.
  - Channeling credits through BUUDs and KUDs.
  - BULOG (formed in 1967) was asked to establish floor and ceiling prices of rice.
- When oil revenues declined, BIMAS was replaced INMAS (BIMAS– credits), later on INSUS, OPSUS and in 1987 SUPRA INSUS.

Oil Boom

- Extractions of natural resources were started from producing the following laws (Resosudarmo, 2005):
  - Law 1/1967 on foreign investment, which provided clear procedures for foreign operations in Indonesia along with generous tax concessions for foreign companies.
  - Law 5/1967 on forestry, which put all forests under the control of the state.
  - Law 11/1967 on mining, inferring that all lands within the Republic could be used for mining.
- Strengthen the roles of military in the government, in a centralistic system of government, protecting the implementation of these Laws.
- Some similarities in regard of central state capture phenomena; i.e., land 'appropriation' and (military) centralistic system of government.
- Aiming for effective resource extractions for growth acceleration of the country.

Role of Oil & Gas Mining in Indonesia



- Law 1/1967 on foreign investment, in complement of Pertamina's activities, attract foreign investments in oil and gas.
- Oil and gas extractions could be accelerated in 1970s and 1980s (also supported by increasing the prices of oil and gas).
- In 1970s and 1980s, oil and gas revenues dominated government revenues (most likely we over expanded this sector).
- As the prices of oil dropped in mid 1980s, the domination of oil and gas revenue declined.

Source: Ministry of Finance

Issues with BIMAS

- Considered a very high-cost program:
  - Subsidized interest rate.
  - Abuse activities: corruptions, collusion between pesticide companies and high-ranking officials.
  - Low rate of repayment.
  - **Overuse of subsidized fertilizer and pesticide**
- Pesticide resistance:
  - Brown planthoppers outbreak in 1976/77: damaged more than 450 000 ha of rice fields and estimated yield loss of 364 500 tons of milled rice (Oka, 1997).
  - Brown planthoppers outbreak 1986: destroyed approximately 200 000 ha of rice crops (Useem et al., 1992).
- Human pesticide poisoning became evident.
  - In 1986, +/- 400 cases of pesticide poisoning, with 32 fatalities found in Java (Mustamin, 1988).
  - In 1988, +/- 1200 cases of acute pesticide poisoning and 20 to 50 per cent of the farmers who used pesticides contracted chronic pesticide-related illnesses in Java and Bali.
- Green revolution with overuse of chemical product is not a path of **sustainable development**.

Integrated Pest Management Era

Local research and the struggle for policy change

- The issues of pest outbreaks due to pesticide resistance happened around the world by mid 1970s. Global agricultural academic communities quickly searched for an alternative (Pimentel et al., 1992).
- Extensive research finding alternative to avoid pest resistance. Indonesian scientists were also participated in this global search.
- By the end of 1970s, it was concluded that agricultural communities had to stop relying solely on pesticides to control pest, and needed to employ additional controls including synchronized planting, crop rotation and natural predators – that is, to adopt the Integrated Pest Management (IPM) approach.
- Indonesian agricultural scientists brought the ”new” idea to various governmental meetings: calling for the adoption for an IPM program (leading to sustainability of agricultural production) and the abolishment of pesticide subsidies to reduce the use of pesticides.
- Strong opposition from officials in the Ministry of Agriculture (MOA), who still believed in the effectiveness of using chemical pesticides alone and instructing farmers to spray pesticides was easier. Also due to collusion between pesticide companies and high-ranking officials.
- But agree to implement a safe use of pesticide program → difficult to implement.

Integrated Pest Management Era

Presidential Instruction No. 3/1986: the context for national political support

- The newly rice self sufficiency disrupted by the 1986 pest outbreaks aroused concern of the head of BAPPENAS who then sought from scientists at the MoA.
- The dropped of oil price in 1986 triggered ways to reduce government expenditure; i.e. particularly reducing subsidies
- The president interested with the IPM option and so produce the INPRES No. 3/1986.
  - to develop manpower, both farmers and field personnel, at a grassroots level to implement an IPM programme.
  - to increase efficiency of input use of pesticides.
  - to improve the quality of the environment and, by extension, human health (Oka, 1997).
- The decree provided the necessary impetus for national political support to establish the IPM programme as a national policy that required the support of all government agencies, including the military.
- Subsidies for pesticides were decreased from 75–80 per cent of the market price in 1986 to 40–45 per cent in 1987, before being completely eliminated in January 1989.

Integrated Pest Management Era

The first stage of the IPM programme, 1989–1993: the role of BAPPENAS in the bureaucratic breakthrough

- Realizing that MOA could not be expected to actively implement IPM training for extension workers and farmers, BAPPENAS undertook the role as the implementor of the IPM program.
- IPM Advisory Board was established consisting of high-ranking officers from BAPPENAS, the MOA and Ministry of Home Affairs to 'force' sectoral ministries to participate.
- A Steering Committee – made up of IPM experts from various government agencies, universities, the UN Food and Agricultural Office (FAO) Regional Office for Asia and the Pacific and other international institutions – was formed to direct and assess programme activities and policy improvements.
- The central activity of this national IPM programme was to educate farmers in IPM using the 'learning by doing' method that was developed collaboratively by Indonesian scientists and international scientists.
- By the end of 1991, about 2000 extension workers and 1000 field pest observers had trained approximately 100 thousand farmers, mostly in provinces in Java. Some 10 percent of the farmers were chosen to receive further training to become trainers.
- Funding was mainly from the USAID. Case studies indicated IPM farmers use 60% less pesticides and able to increase production by 12% (Oka, 1991).

Integrated Pest Management Era

The second stage of the national IPM programme, 1994–1999: competing views within MoA

- Started in mid 1994, differed from the initial start-up stage in that the principal organizer was MoA.
- The transfer of responsibility for implementation of the IPM programme from BAPPENAS was slow, reflecting the struggle of supportive officials and experts within MoA.
- It became one of the projects with MoA. It lost its national political support.

Table 1. Types of food crop farmers attending the second-stage IPM-FFS, 1993–1999.

Farmers	93–94	94–95	95–96	96–97	97–98	98–99
Rice	50 050	115 050	166 950	232 175	130 575	119 975
Palawija*	3 172	4 875	8 575	23 000	6 575	5 325
Vegetable	3 885	1 000	1 800	10 550	4 375	2 275

Note: *dry/inter-season or alternating non-rice crops (such as soybean, maize, groundnut and cassava).
Source: MOA (1999).

Achievements

- Changes in farmers' knowledge of and attitudes towards insects and pesticides (Oka, 1991; Pincus, 1991; Useem et al., 1992; Winarto 1995; 2004).
- Enrichment of farmers' general cropping skills (Deybe et al., 1998; Winarto, 2004a).
- Enhancing farmers' confidence in decision making (Oka & Dilts, 1993).
- Enhanced women's participation in crop management (Kingsley and Siwi, 1997).
- Health impacts (Kishi et al., 1995; Kishi, 2002).
- Increasing farmers' income (Oka, 1997; Kuswara, 1998a; 1998b; Paiman, 1998a; 1998b; Susianto et al., 1998; van der Berg, 2004).

Issues

- Slow diffusion of environmental techniques (Feder et al., 2004).
- No coherence and duration of IPM practices (Pincus, 2002).
- Financial crisis: The final collapse of the IPM programme.

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DOES SENDING FARMERS BACK TO SCHOOL HAVE AN IMPACT? REVISITING THE ISSUE

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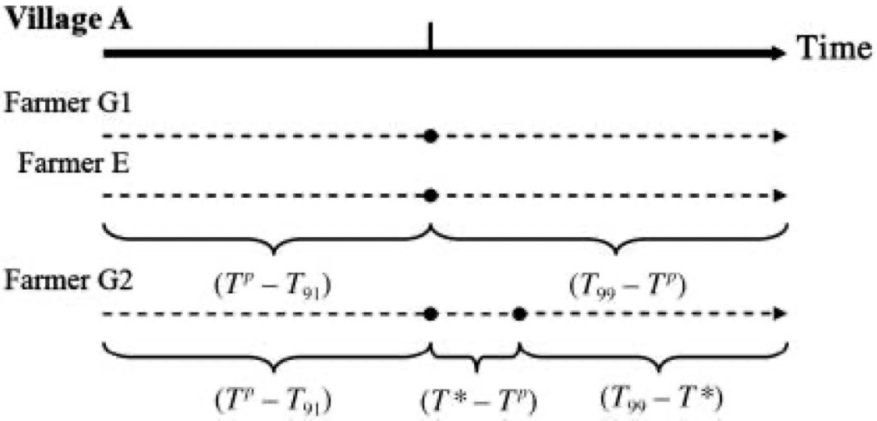
The Farmer Field School (FFS) is an intensive training program providing farmers with science-based knowledge and practices, including integrated pest management. Recently there has been intensive debate as to whether or not this kind of training has any significant impact. Most case studies argue that the impact, in terms of a farmer's ability to reduce the use of pesticides while increasing yields, is significant. However, panel data studies using household panel data sets for Indonesia have not been able to confirm that this is the case. The present paper uses panel data available from previous panel data studies and applies a new model specification to reevaluate whether or not the FFS induces better performances among farmers enrolled in the program and also among their neighbors, who are expected to receive some spillover knowledge from the FFS alumna.

Data sets are observations in 1991 and in 1999.

Fig. 1. Time Path of Different Farmers



$$y = \theta + \alpha_1 d_E + \alpha_2 d_g + \beta_1(T^* - T^p) + \beta_2(T_{99} - T^*) + \Delta X\gamma + \Delta Z\delta + \varphi d_d + e, \quad (5)$$

y = ln y99 – ln y91 for rice yield and y = y99 – y91 for pesticide costs

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TABLE 1 (Continued)

	Category of Farmer				
	Total	Control	Graduates		Exposed
			G1	G2	
Area for main plot (ha)	0.58	0.40	0.79	0.78	0.50
	(0.95)	(0.29)	(1.44)	(1.43)	(0.56)
Total *sawah* area owned (ha)	0.82	0.54	1.07	1.36	0.61
	(2.27)	(0.47)	(2.44)	(4.06)	(1.38)
No. of household members	4.76	4.88	4.92	4.68	4.71
	(1.79)	(1.48)	(1.68)	(1.74)	(1.94)
Village characteristics					
Presence of pest observer (0 1)	1.00	1.00	1.00	1.00	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Distance to Kecamatan center (time)	16.14	20.77	12.96	17.78	14.94
	(7.59)	(8.13)	(6.69)	(8.37)	(6.48)
% *sawah* land that is rainfed	0.18	0.23	0.20	0.24	0.14
	(0.35)	(0.21)	(0.40)	(0.42)	(0.34)
Length of asphalted road (km)	1.77	0.25	1.81	2.03	2.16
	(1.69)	(0.74)	(1.04)	(1.64)	(1.82)
No. of kiosks	1.80	2.65	1.37	2.16	1.50
	(1.49)	(2.40)	(0.99)	(1.05)	(1.23)

Impact of Farmer Field School on Rice Yield (Dependent Variable: Growth Rate of Yield of Rice)

	FD	FDw/VFE
Key variables		
No. of seasons for exposure	−0.0061	−0.0061
	(−1.32)	(−1.88)*
No. of seasons for postgraduate	−0.015	−0.015
	(−2.76)**	(−3.35)**
Dummy for exposed	0.36	0.36
	(2.71)**	(2.27)**
Dummy for graduate	0.51	0.51
	(3.53)**	(3.26)**

Impact of Farmer Field School on Pesticide Cost (Dependent Variable: Change in Pesticide Cost)

	FD	FDw/VFE
Key variables		
No. of seasons for exposure	−1.38	−1.38
	(−0.41)	(−0.80)
No. of seasons for postgraduate	0.47	0.47
	(0.12)	(0.22)
Dummy for exposed	−36.84	−36.84
	(−0.38)	(−0.45)
Dummy for graduate	−89.20	−89.20
	(−0.85)	(−1.14)

Declining the effectiveness of FFS-IPM Program.

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REDUCING THE NUMBER OF PESTICIDE-RELATED ILLNESSES: THE IMPACT ON HOUSEHOLD INCOMES IN INDONESIA

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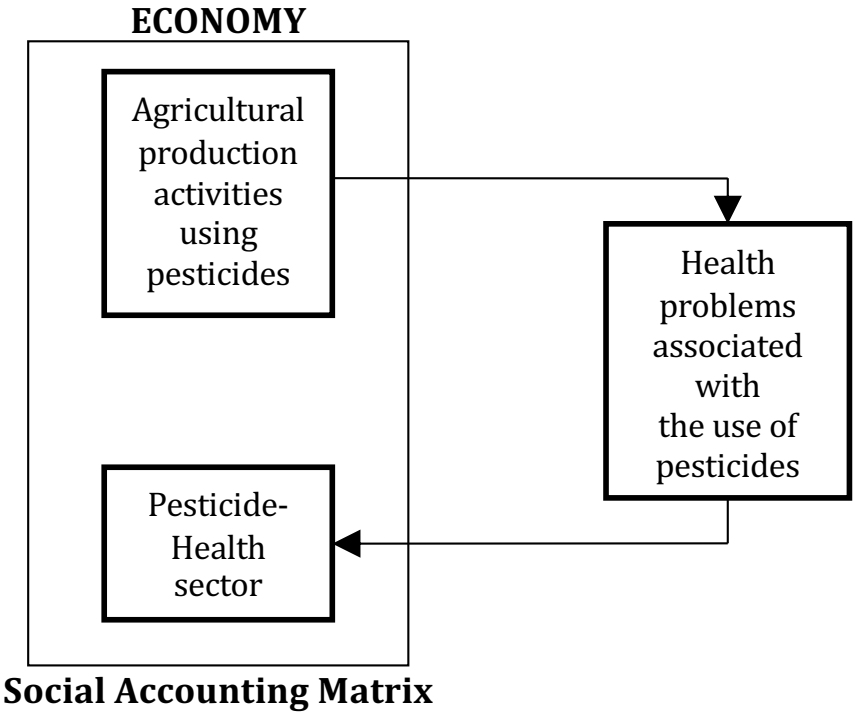
The increasing number of human health problems caused by the use of pesticides serves as a warning to countries to develop preventive programs. Developing countries, however, are concerned about the effect of such programs on household incomes. With Indonesia as a case study, this paper presents a procedure to broaden a Social Accounting Matrix to include the impact of agricultural pesticide use on human health. This approach utilises the Constrained Fixed Price Multiplier method to analyse the effect, on the household incomes of different socio-economic classes, of government programs that are designed to reduce human pesticide-related illnesses. The results show that reducing such illnesses through the Safe Use of Pesticides program or the Integrated Pest Management program induces a more equal income distribution.

Model Simulated



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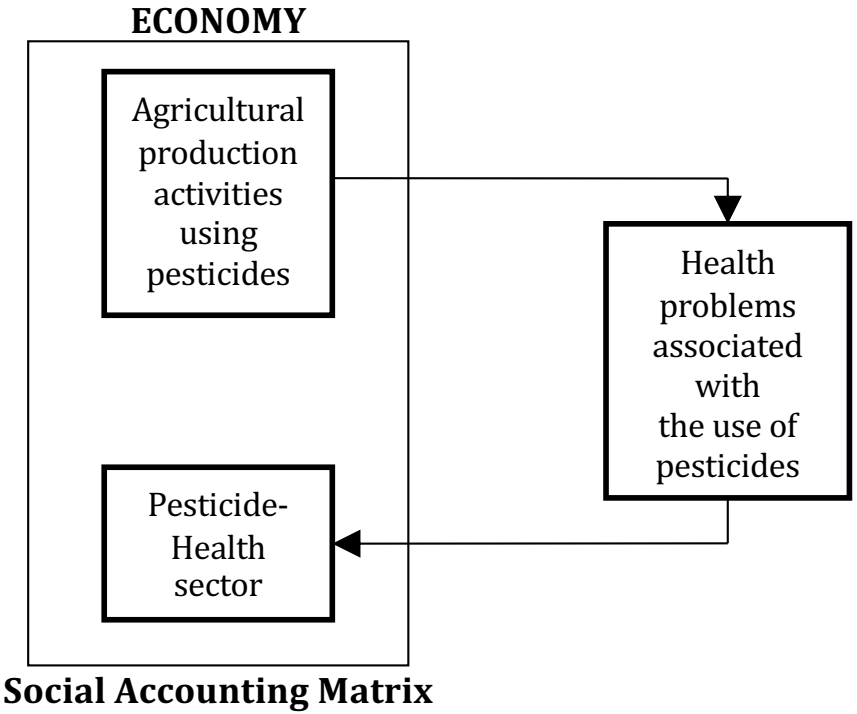
Model Simulated



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Implementation

Utilized Indonesian 1990 SAM produced by BPS: 22 production sectors

22 production sectors; 10 type of households plus corporate & government, 16 types of labour & 7 types of capital

Add two new production sectors:

- Pesticide-related illness sector
- Pesticide poisoning cases

Health cost to recover from pesticide poisoning cases

- Pesticide health service sector
- Separated from Public service sector

Production Sectors

1	Food Crop	12	Chemical and Basic Metal
2	Nonfood Crop	13	Electricity Gas Water
3	Livestock	14	Trade and Storage
4	Forestry and Hunting	15	Restaurant
5	Fishery	16	Hotel
6	Metal Ore Petroleum Mining	17	Land Transportation
7	Other Mining	18	Air and Water Trans
8	Food Drink Cigarette	19	Bank and Insurance
9	Textile and Leather	20	Real Estate
10	Wood and Construction	21	Public Service
11	Paper and Metal Product	22	Personal Service

Institutions

1	Ag Employee	6	Rural Non-labor
2	Small Farmer	7	Rural High
3	Medium Farmer	8	Urban Low
4	Large Farmer	9	Urban Non-labor
5	Rural Low	10	Urban High
11	Company	12	Government

Factors

1	Ag Paid Rural	9	Cler Paid Rural
2	Ag Paid Urban	10	Cler Paid Urban
3	Ag Unpaid Rural	11	Cler Unpaid Rural
4	Ag Unpaid Urban	12	Cler Unpaid Urban
5	Man Paid Rural	13	Prof Paid Rural
6	Man Paid Urban	14	Prof Paid Urban
7	Man Unpaid Rural	15	Prof Unpaid Rural
8	Man Unpaid Urban	16	Prof Unpaid Urban
17	Uninc Capital Land	21	Inc Capital Domestic
18	Uninc Capital Housing	22	Inc Capital Government
19	Uninc Capital: Rural	23	Inc Capital Foreign
20	Uninc Capital: Urban		

Other Accounts

Capital Account
Indirect Tax and Subsidy
Rest of the World

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Institutions

1	Ag Employee	6	Rural Non-labor
2	Small Farmer	7	Rural High
3	Medium Farmer	8	Urban Low
4	Large Farmer	9	Urban Non-labor
5	Rural Low	10	Urban High
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Factors

1	Ag Paid Rural	9	Cler Paid Rural
2	Ag Paid Urban	10	Cler Paid Urban
3	Ag Unpaid Rural	11	Cler Unpaid Rural
4	Ag Unpaid Urban	12	Cler Unpaid Urban
5	Man Paid Rural	13	Prof Paid Rural
6	Man Paid Urban	14	Prof Paid Urban
7	Man Unpaid Rural	15	Prof Unpaid Rural
8	Man Unpaid Urban	16	Prof Unpaid Urban
17	Uninc Capital Land	21	Inc Capital Domestic
18	Uninc Capital Housing	22	Inc Capital Government
19	Uninc Capital: Rural	23	Inc Capital Foreign
20	Uninc Capital: Urban		

Other Accounts

Capital Account
Indirect Tax and Subsidy
Rest of the World

Scenarios

SUP program: An improvement in occupational safety standards results in a 50% reduction in the number of pesticide-related illnesses. The amount of pesticide use and the output of agricultural sectors remain unchanged

Conservative IPM program: Farmers are able to reduce the quantity of pesticides they use by 60% (60% reduction in the number of pesticide-related illnesses), while maintaining a constant level of agricultural output

Progressive IPM program: A 60% reduction in the quantity of pesticide use (60% reduction in the number of pesticide-related illnesses) and a 12% increase in agricultural output

SUP Program

An improvement in occupational safety standards results in a 50% reduction in the number of pesticide-related illnesses. The amount of pesticide use and the output of agricultural sectors remain unchanged

50% reduction in the number of pesticide-related illnesses → Constrain and reduce the pesticide-health service sector by 50%

Constrain the output of agricultural sector to be fixed

Run the constrained fixed price multiplier analysis

Conservative IPM Program

Farmers are able to reduce the quantity of pesticides they use by 60% (60% reduction in the number of pesticide-related illnesses), while maintaining a constant level of agricultural output

60% reduction in the number of pesticide-related illnesses → Restrict and reduce the pesticide-health service sector by 60%

Constrain the output of agricultural sector to be fixed

Reduce the use of pesticide by the agricultural sector by 60% (coefficient in the A matrix)

Run the constrained fixed price multiplier analysis

Progressive IPM Program

A 60% reduction in the quantity of pesticide use (60% reduction in the number of pesticide-related illnesses) and a 12% increase in agricultural output

60% reduction in the number of pesticide-related illnesses → Restrict and reduce the pesticide-health service sector by 60%

Constrain the output of agricultural sector to be increased by 12%

Reduce the use of pesticide by the agricultural sector by 60% (coefficient in the A matrix)

Run the constrained fixed price multiplier analysis

Constrained Fixed Price Multiplier

$$\begin{bmatrix} Y_{NC} \\ Y_{NC} \end{bmatrix} = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix} \begin{bmatrix} Y_{NC} \\ Y_{NC} \end{bmatrix} + \begin{bmatrix} X_{NC} \\ X_{NC} \end{bmatrix}$$

Y_{NC} = total income vector of non-constrained sectors

Y_C = total income vector of constrained sectors

X_{NC} = exogenous vector of non-constrained sectors

X_C = exogenous vector of non-constrained sectors

Some constrainded income/output

$$\begin{bmatrix} Y_{NC} \\ Y_C \end{bmatrix} = \begin{bmatrix} A_{NC} & Q \\ R & A_C \end{bmatrix} \begin{bmatrix} Y_{NC} \\ Y_C \end{bmatrix} + \begin{bmatrix} X_{NC} \\ X_C \end{bmatrix}$$

We then get:

$$\begin{bmatrix} Y_{NC} \\ X_c \end{bmatrix} = \begin{bmatrix} I - A_{NC} & 0 \\ R & I \end{bmatrix}^{-1} \begin{bmatrix} I & Q \\ 0 & A_C \end{bmatrix} \begin{bmatrix} X_{NC} \\ Y_c \end{bmatrix}$$

Results

Household Classifications	SUP		Conservative IPM		Progressive IPM	
	Foodb (1a)	Non-foodc (1b)	Food (2a)	Non-food (2b)	Food (3a)	Non-food (3b)
Agricultural	0.0167	0.0067	11.3674	6.9683	346.5349	115.6479
Employee	0.00%	0.00%	0.17%	0.11%	5.31%	1.77%
Small-scale	0.0388	0.0156	61.2046	21.2243	1851.303	388.415
Farmer	0.00%	0.00%	0.19%	0.06%	5.64%	1.18%
Medium-	0.0104	0.0042	16.1648	5.4645	473.5001	96.7492
scale Farmer	0.00%	0.00%	0.21%	0.07%	6.21%	1.27%
Large-scale	0.0154	0.0062	22.2309	7.5834	643.6281	132.1849
Farmer	0.00%	0.00%	0.22%	0.07%	6.33%	1.30%
Rural	0.0068	0.0027	4.8529	2.3697	262.9903	70.4479
Low	0.00%	0.00%	0.05%	0.03%	2.80%	0.75%
Rural Non-	–0.0033	–0.0013	–0.1214	0.051	53.7535	14.7526
labour	–0.0001%	0.00%	–0.0039%	0.00%	1.74%	0.48%
Rural	–0.1274	–0.0514	14.5848	6.6793	746.9672	194.2388
High	–0.0005%	–0.0002%	0.05%	0.02%	2.76%	0.72%
Urban	–0.0329	–0.0133	1.568	0.59	430.0833	108.1666
Low	–0.0001%	–0.0001%	0.01%	0.00%	1.93%	0.48%
Urban Non-	–0.0167	–0.0067	1.4876	0.5349	181.7641	43.9768
labour	–0.0002%	–0.0001%	0.02%	0.01%	2.52%	0.61%
Urban	–0.3986	–0.1608	–1.9001	–0.8482	808.515	204.1375
High	–0.0009%	–0.0004%	–0.0043%	–0.0019%	1.81%	0.46%

Lessons from the IPM Program

Condition	1990s IPM
Domestic research	MoF – IPB - UGM
Crisis	Pest resistance outbreak
Political supports	President (InPres)
Breakthrough	BAPPENAS
International supports	FAO
Mechanism	FFS
Benefits	Rice farmers

Final Remarks

When do sustainable development policy reforms work?

- Relatively solid domestic research linked with international research
- Crisis

Pre

- National political support
- Institutional breakthrough
- International support (intellectual inputs & funding)
- Appropriate implementation mechanism
- Relatively quick direct benefits to target group.

During

List of reading

https://www.dropbox.com/s/hk8i1zlnsz8gcj2/Emil_Salim_KPG_lengkap.pdf?dl=0
https://www.dropbox.com/s/2okhlt6i8h6l26m/book_all_2005.pdf?dl=0
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