

Reinvigorating Cambodian Agriculture: Transforming from Extensive to Intensive Agriculture

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- II. Literature Review : Overview of prior studies and Conceptual Framework
- III. Research Methodology : Research procedure
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Introduction

- Why do we research this project?
 - Due to the import of agricultural products containing chemicals from neighboring countries.
 - Most people live in the countryside and see that the Cambodia has lot of agricultural land. But why is the labour leaving this sector continuous?
- Cambodia agricultural background
 - Average GDP growth was 7% per annum for the period 1999-2017. In 2018, the GDP growth will continue to growth at 7.2% per year, increased 0.2% of 2017 (MEF, 2018).
 - The contribution of agriculture sector to the GDP is about 19.1% (Constant 2000 Prices) of GDP in 2017 and will decreasing about 1% for 2018 (MEF, 2018).

Introduction — Cont.

- The contribution of agricultural sub-sector to the GDP is crop production (10.5%), livestock & poultry (2.6%), fisheries (5.0%) and forestry & logging (1.0%) at constant 2000 prices in 2017 (MEF 2018).
- The growth of agriculture sector in constant 2000 prices was 1.7% in 2017 and will decrease to 1.3% in 2018 (MEF 2018).
- The labour in agriculture sector has been remarkably decreased, it was 55.8% of the total labour in 2011, decreased to 48.7% in 2013 and dropped slightly to 45.3% in 2014. In 2016, this trend went down dramatically to 36.4% (NIS 2016).

Introduction — Cont.

- The objectives:
 - What are the factors constraining the Cambodian agriculture in transforming from extensive to intensive agriculture?
 - How Cambodia transform from extensive to intensive agriculture?
- Scope of study : The study focus on crops and livestock

Literature Review

- Definition

Extensive Agriculture:

A way of farming which is characterized by a low level of inputs per unit of land (Encyclopaedia 1970).

Intensive Agriculture:

Involves various types of agriculture with higher levels of input and output per cubic unit of agricultural land area (FAO 2004).

Literature Review — Cont.

- Overview of Prior study
 - Agricultural intensification : 26 articles (1980-2018)
 - Agricultural trade & welfare : 12 articles (2007-2018)
 - Technology & innovation : 12 articles (2005-2018)
 - Agriculture & climate change : 9 articles (2011-2018)
 - Agricultural investment : 4 articles (2007-2017)
 - Others : 17 articles (2003-2018)

Literature Review — Cont.

- Sustainable intensive farming practices have been developed slowly the deterioration of agricultural land and even regenerate **soil health** and **ecosystem services**, while still offering high yields.
- Increased use of fertilizers, plant growth regulators, pesticides, mechanized agriculture, controlled by increase, more detail analysis of growing conditions, including weather, soil, water, weeds, and pests.

Figure 1: Conceptual Framework

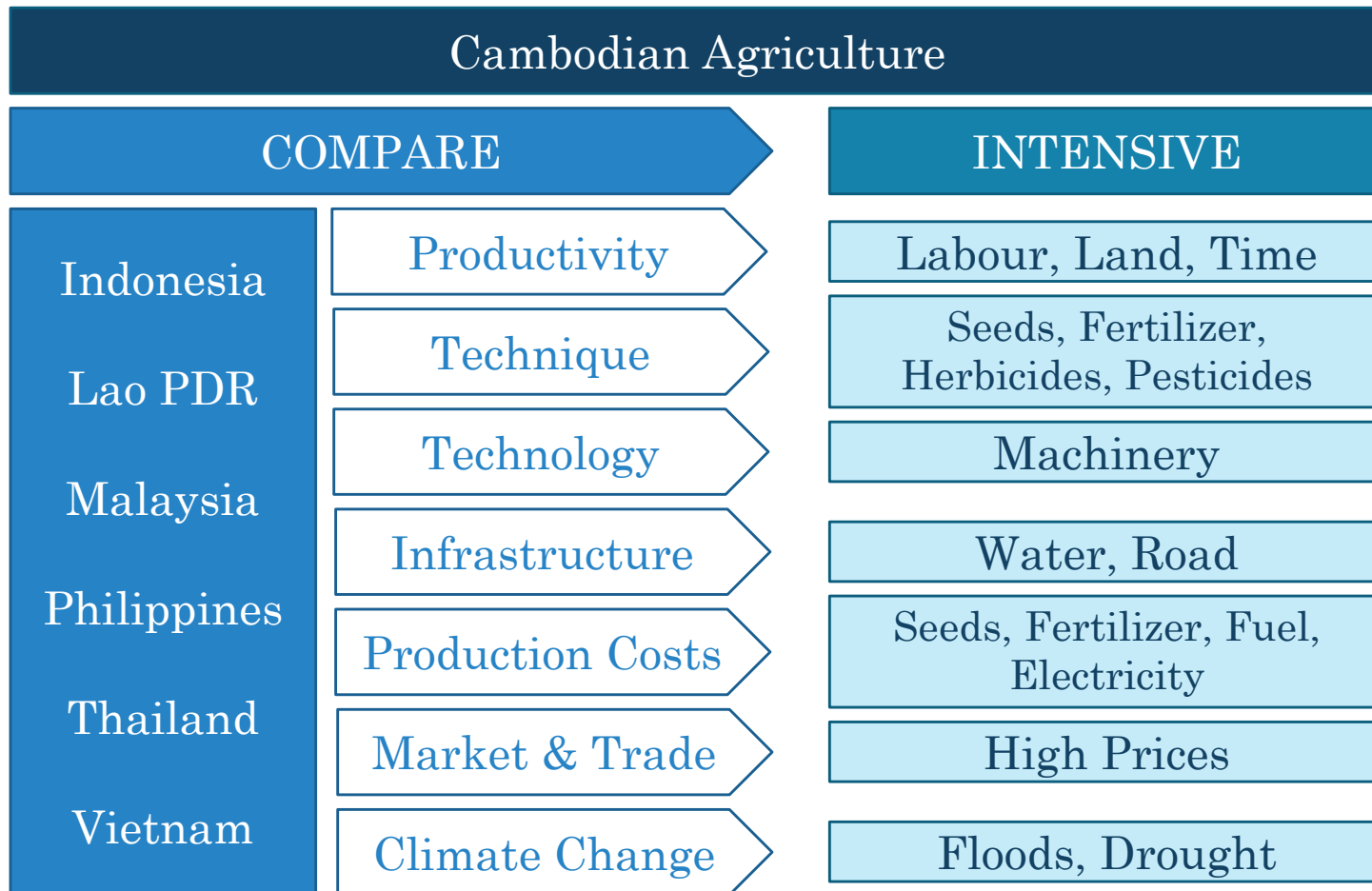


Table 1: Variables using in research project

Variables	Descriptions	Unit
Technique	A way of carrying out a particular task	
Technology	Machines and techniques for use in agriculture	
Fertilizer	Chemical or natural substance spread and mixed with soil to stimulate plant growth	Kg per hectare
Arable land	Land which has been ploughed and cropped	Hectares per person
Land use	The way in which land is used for different purposes such as farming or recreation	Km ²
Irrigation	The water supply to land or crops to help growth	M ³ per hectare
Seed	The unit of reproduction of a flowering plant	Kg per hectare
Herbicide	Chemical that kills plants	Kg per hectare
Pesticide	Chemical compound used to kill pests	Kg per hectare
Climate change	A change in climate caused by human activities or natural phenomena.	

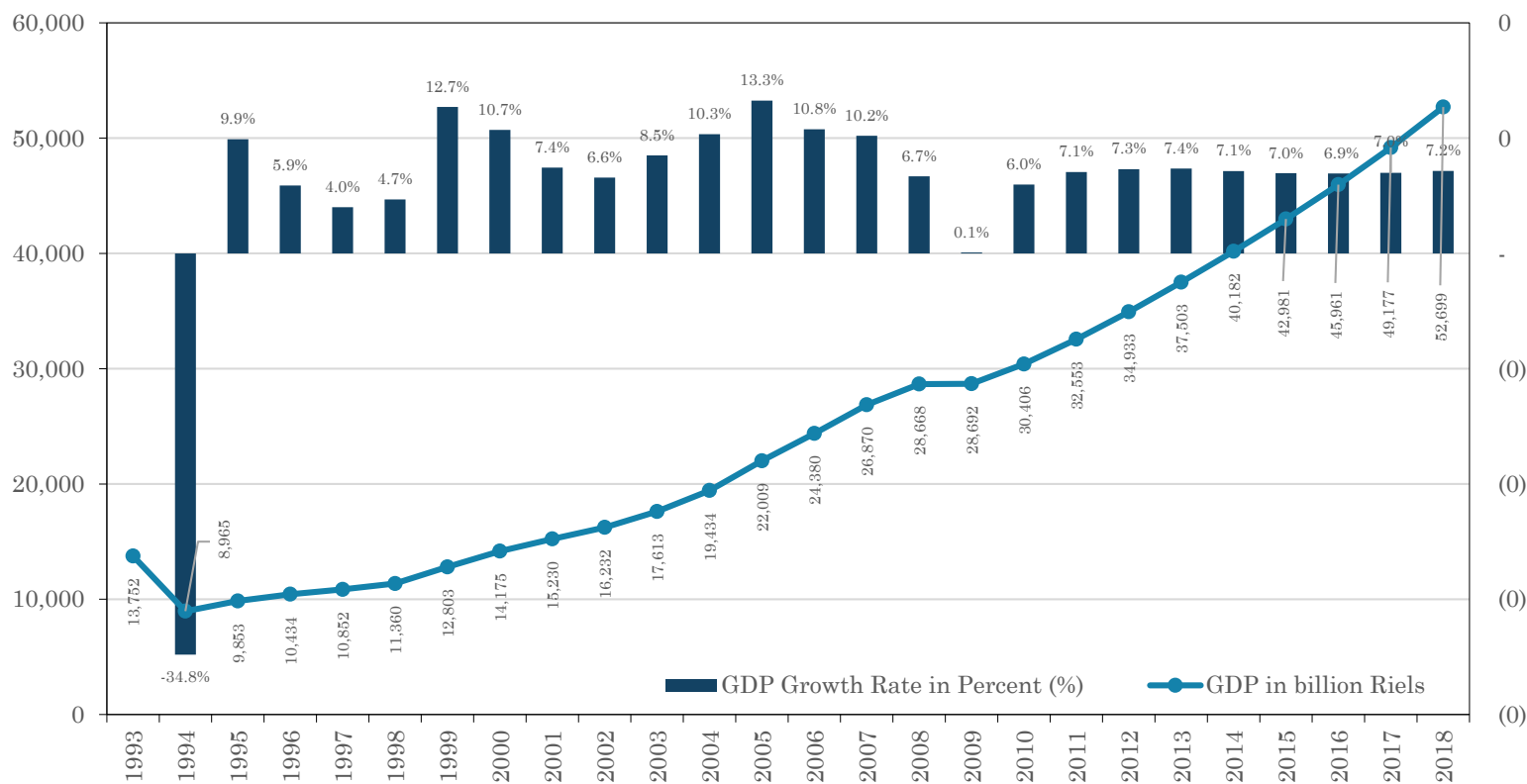
Research Methodology

Data Collection: Quantitative

- Ministry of Agriculture, Forestry and Fisheries (MAFF)
- Food and Agriculture Organization of the United Nations (FAO)
- World Development Indicator (WDI) of the World Bank Group
- National Institute of Statistics (NIS)
- United States Department of Agriculture (USDA)

Findings and Discussion

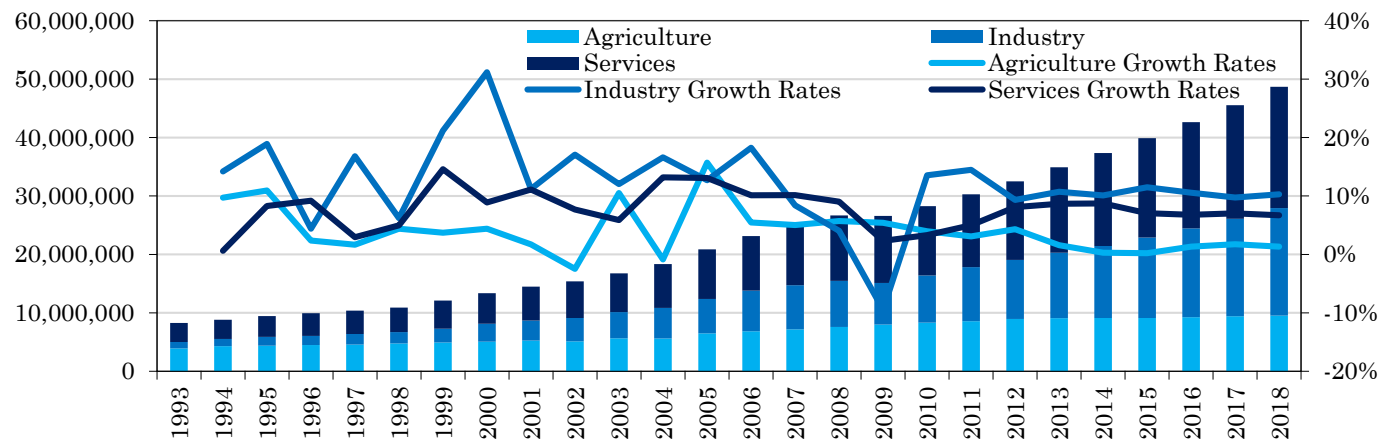
Figure 2: Cambodia GDP in Million Riels at constant 2000 prices



Source: Ministry of Economy and Finance 2018

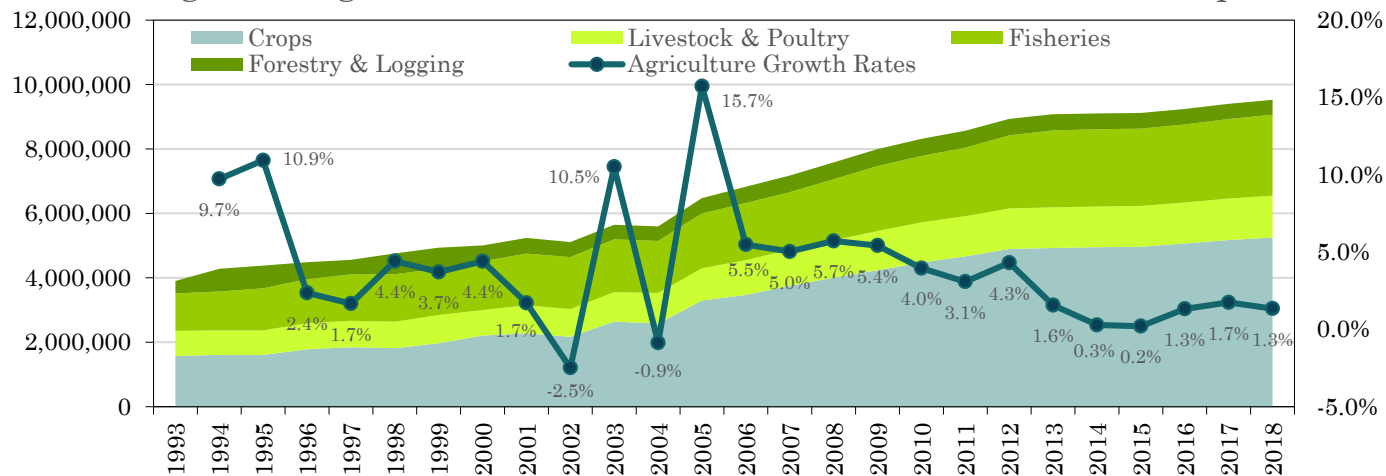
Findings and Discussion — Cont.

Figure 3: Cambodia GDP by sector in Million Riels at constant 2000 prices



Source: Ministry of Economy and Finance 2018

Figure 4: Agricultural Value in Million Riels at constant 2000 prices



Source: Ministry of Economy and Finance 2018

Findings and Discussion — Cont.

Figure 5: Value in Million Riels and Growth Rates, in percent at constant 2000 prices

Figure 5.1: Crops value in Million Riels

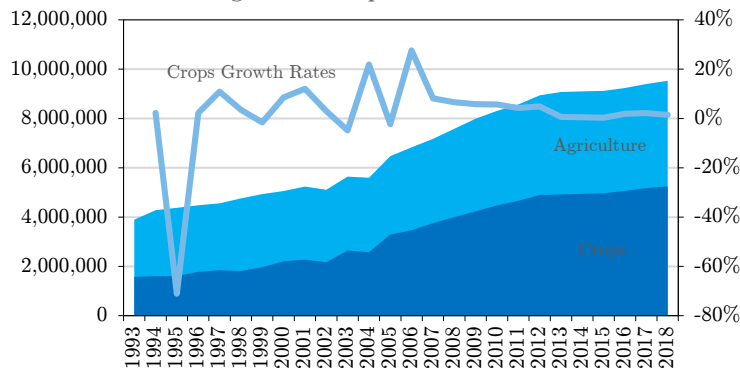


Figure 5.2: Livestock value in Million Riels

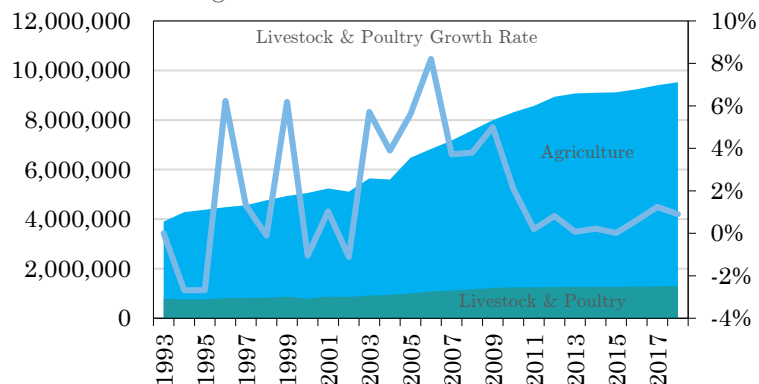


Figure 5.3: Fisheries value in Million Riels

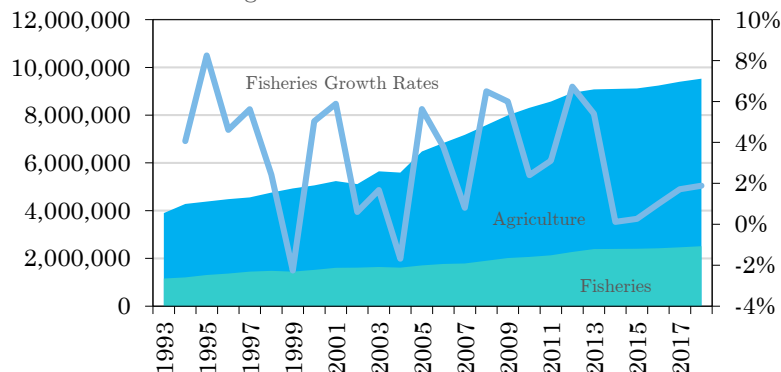
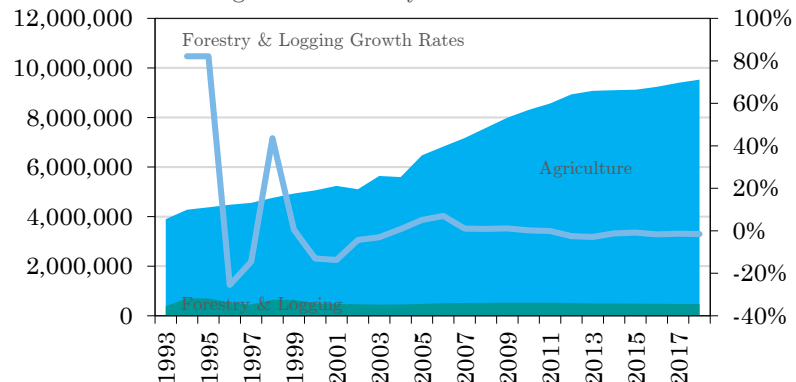


Figure 5.4: Forestry value in Million Riels



Source: Ministry of Economy and Finance 2018

Findings and Discussion — Cont.

Figure 6: Land area

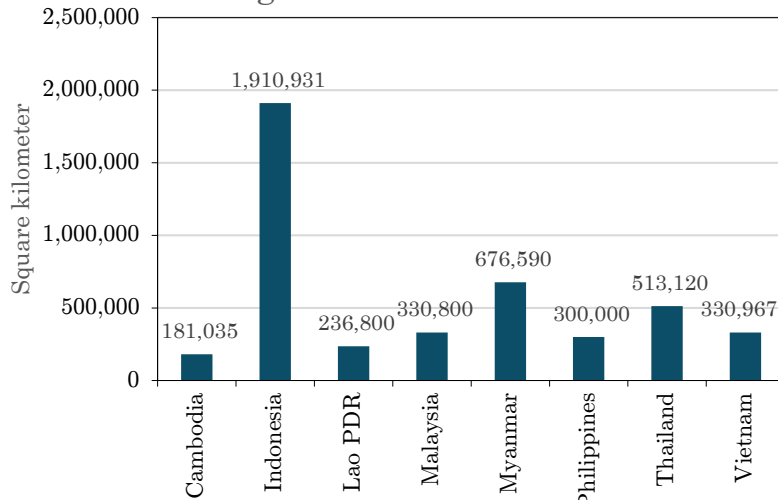
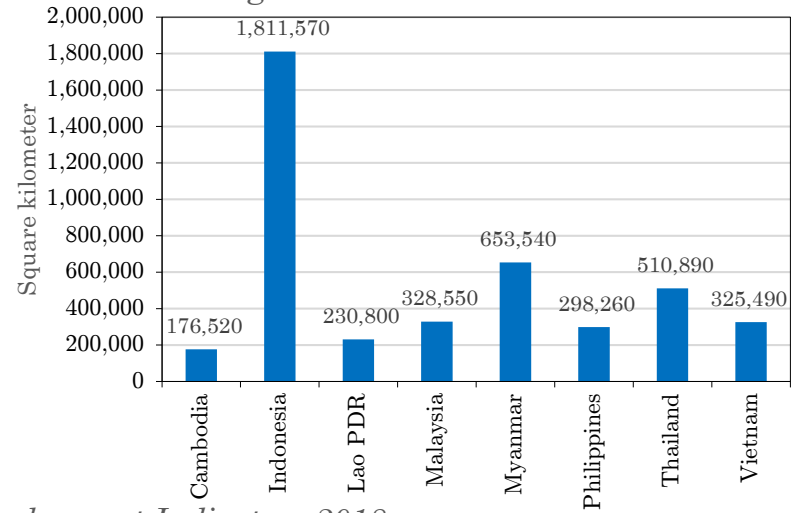
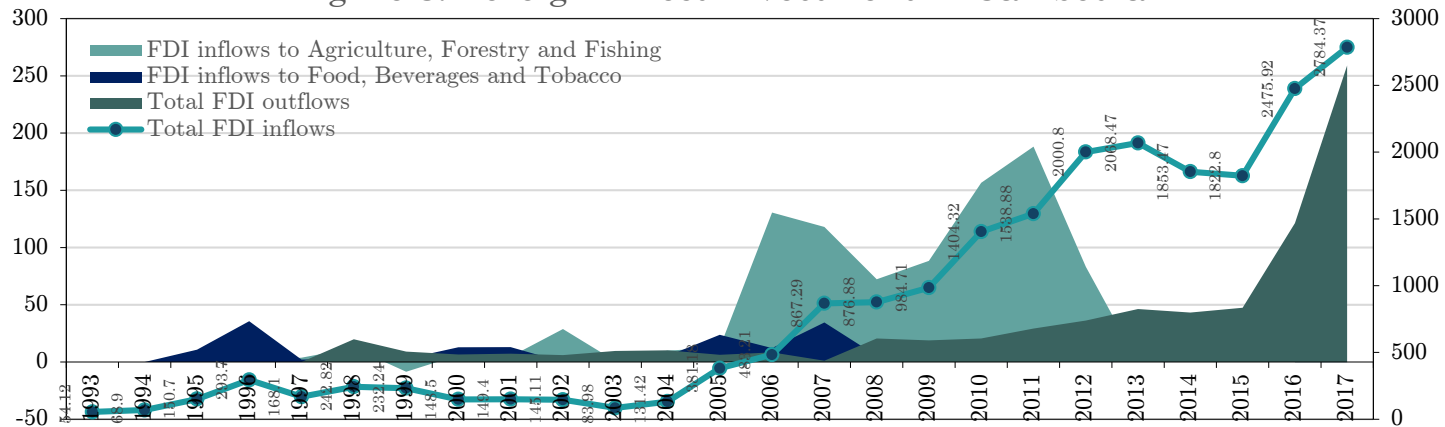


Figure 7: Surface area



Source: World Development Indicators 2018

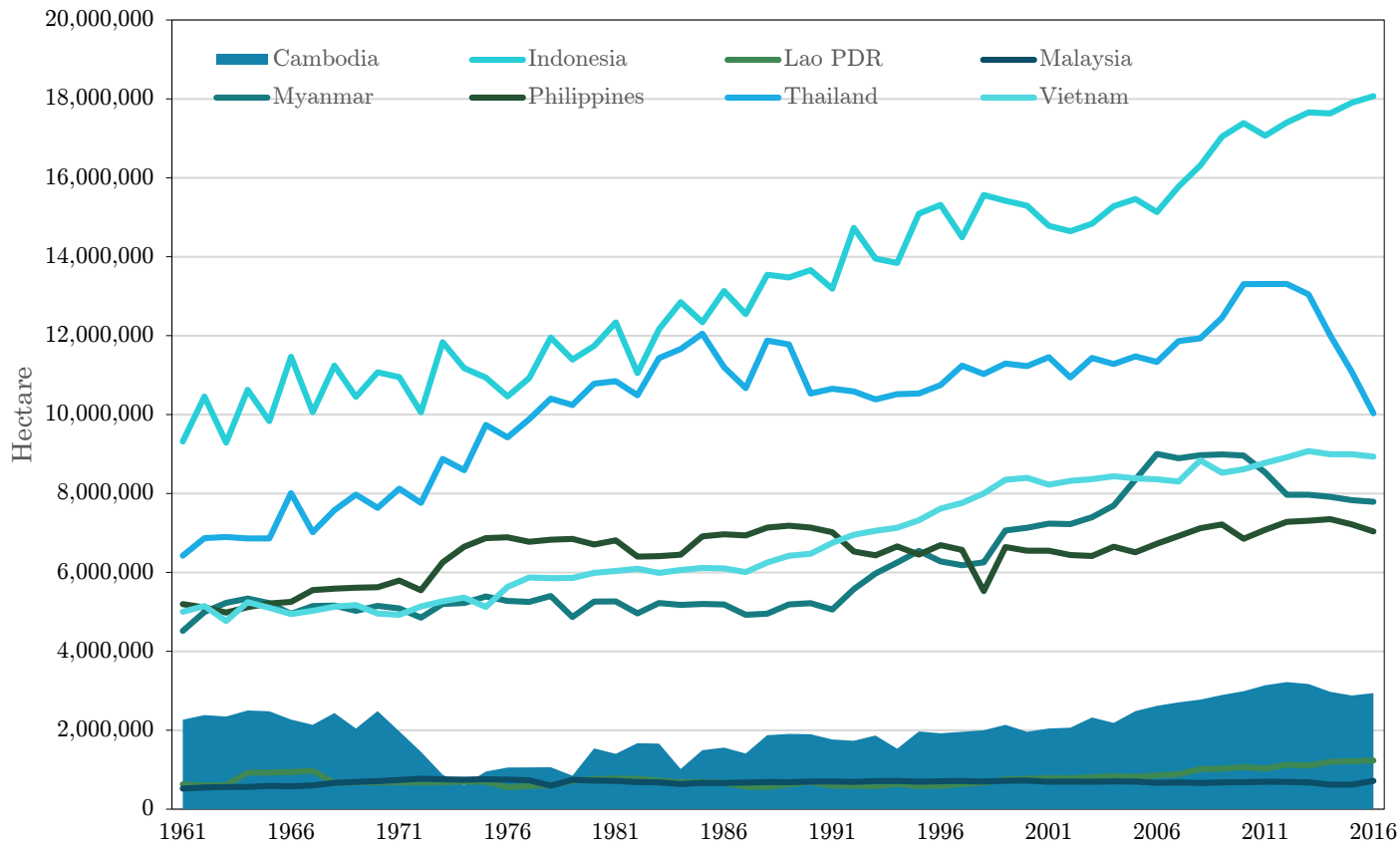
Figure 8: Foreign Direct Investment in Cambodia



Source: World Development Indicators 2018

Findings and Discussion — Cont.

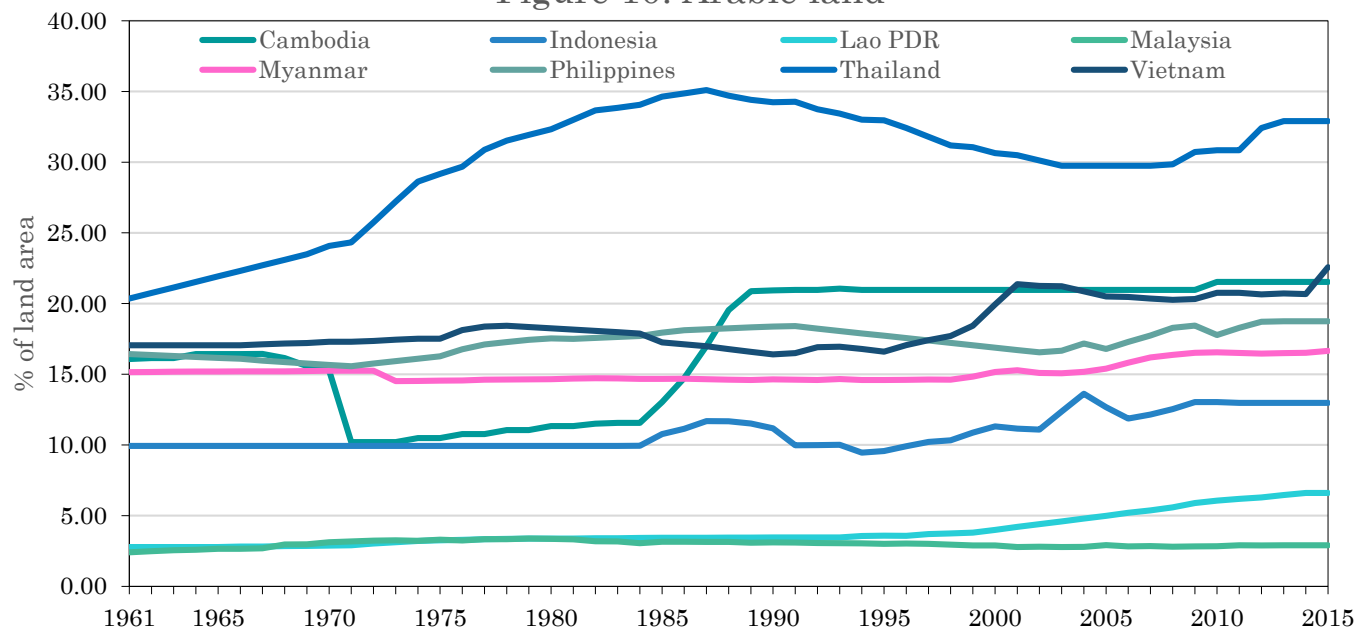
Figure 9: Land under cereal production



Source: World Development Indicators 2018

Findings and Discussion — Cont.

Figure 10: Arable land

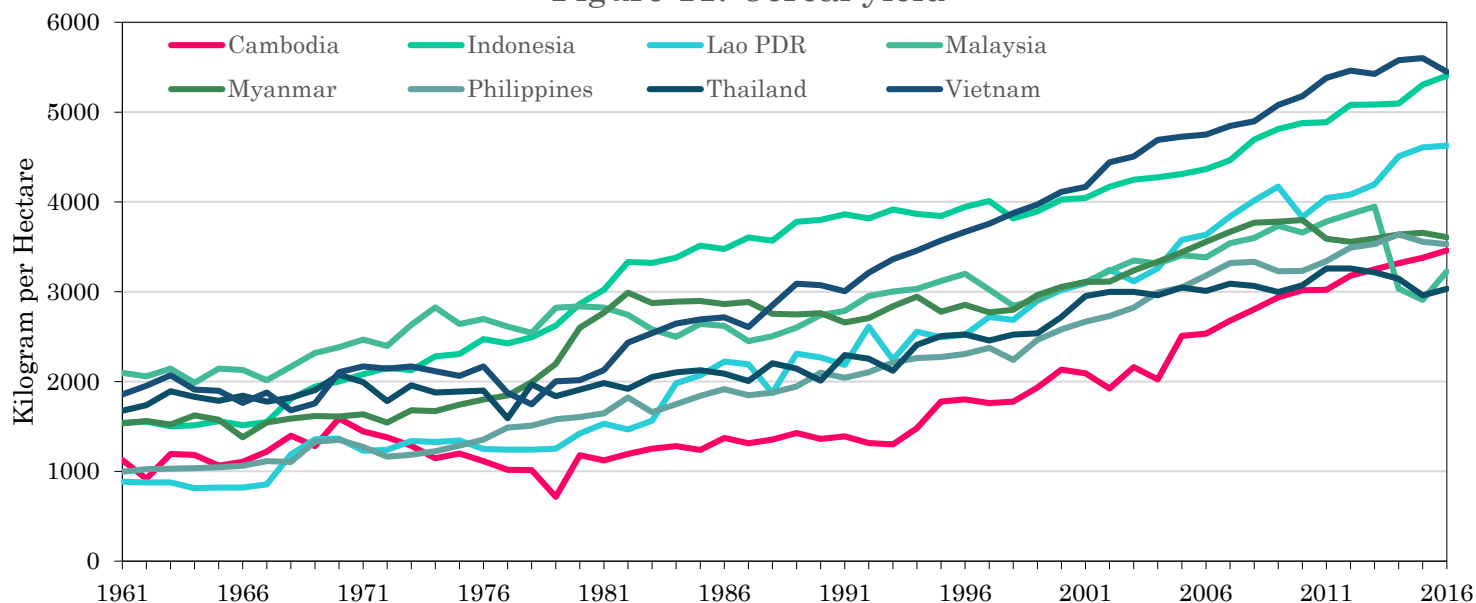


	1961	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015
Cambodia	16.08	16.43	15.26	10.48	11.33	13.03	20.93	20.96	20.96	20.96	21.53	21.53
Indonesia	9.94	9.94	9.94	9.94	9.94	10.76	11.18	9.57	11.32	12.67	13.03	12.97
Lao PDR	2.77	2.77	2.88	3.25	3.38	3.43	3.46	3.59	3.99	4.98	6.07	6.61
Malaysia	2.40	2.65	3.11	3.30	3.36	3.16	3.10	3.00	2.90	2.91	2.83	2.90
Myanmar	15.15	15.19	15.26	14.54	14.65	14.68	14.64	14.60	15.16	15.40	16.55	16.66
Philippines	16.43	16.16	15.66	16.27	17.53	17.94	18.38	17.72	16.88	16.79	17.78	18.75
Thailand	20.36	21.92	24.08	29.16	32.33	34.63	34.24	32.96	30.64	29.75	30.85	32.90
Vietnam	17.05	17.05	17.30	17.51	18.25	17.25	16.40	16.60	19.93	20.51	20.76	22.57

Source: World Development Indicators 2018

Findings and Discussion — Cont.

Figure 11: Cereal yield

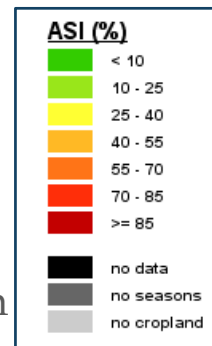


	1961	1966	1971	1976	1981	1986	1991	1996	2001	2006	2011	2016
Cambodia	1126.5	1106.1	1445.5	1113.7	1123.4	1371.7	1390.6	1800.9	2092.6	2533.1	3021.5	3459.9
Indonesia	1541.7	1514.3	2081.7	2472.6	3022.1	3476.2	3862.1	3944.9	4044.9	4365.8	4886.3	5405.5
Lao PDR	884.1	820.8	1229.9	1248.6	1530.2	2221.2	2186.6	2523.3	3094.4	3634.4	4043.3	4626.7
Malaysia	2097	2129	2468.6	2697	2824.4	2619.4	2787.4	3200	3108.1	3383.6	3780.2	3226.5
Myanmar	1535	1380.2	1635.1	1799.4	2766.5	2863.7	2658.2	2853.8	3109.8	3555.7	3589.8	3607.4
Philippines	996.3	1062.8	1272.2	1353.8	1646.6	1914.7	2042.3	2307.5	2667.8	3180.8	3340.6	3529
Thailand	1675.5	1842.8	1993.2	1899.5	1983.4	2089	2295.4	2525.7	2952.6	3009.8	3259.2	3031.8
Vietnam	1856.4	1762	2167.9	2167.9	2127.9	2715.1	3006.4	3666.3	4167.3	4749.8	5381.2	5448

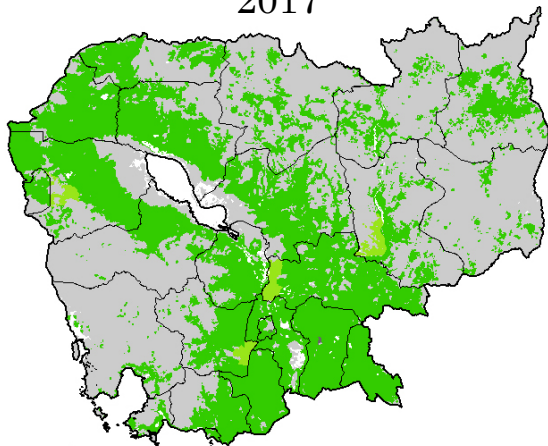
Source: World Development Indicators 2018

Findings and Discussion — Cont.

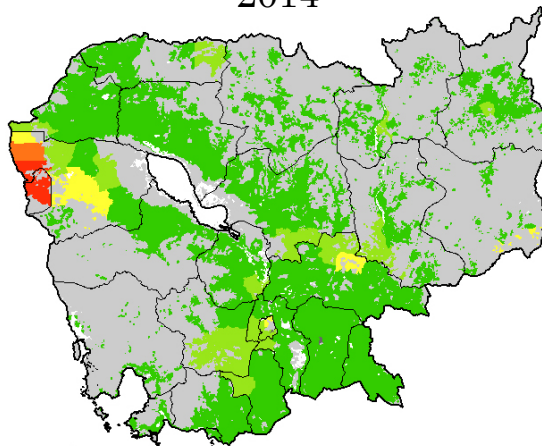
Figure 12: Agricultural Stress Index in Wet Season & Dry Season



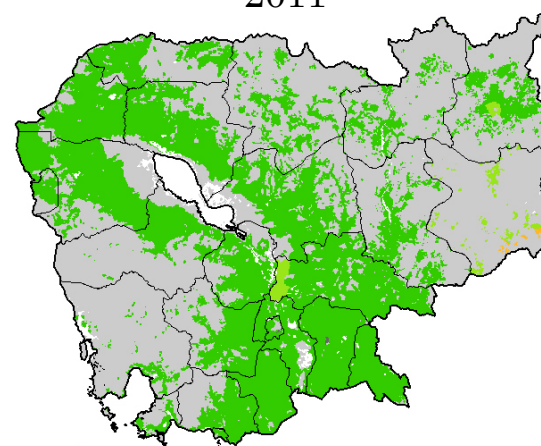
2017



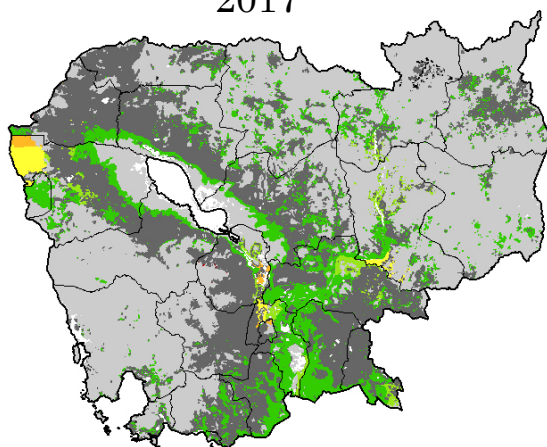
2014



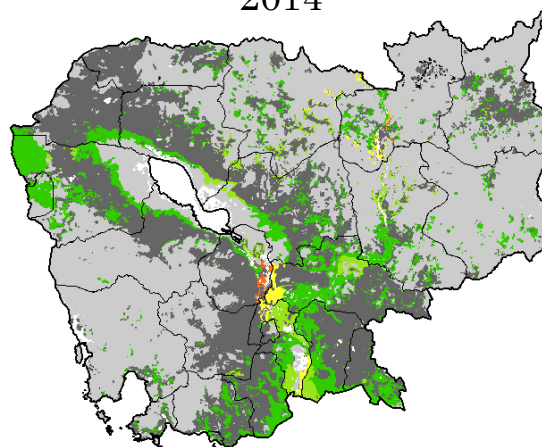
2011



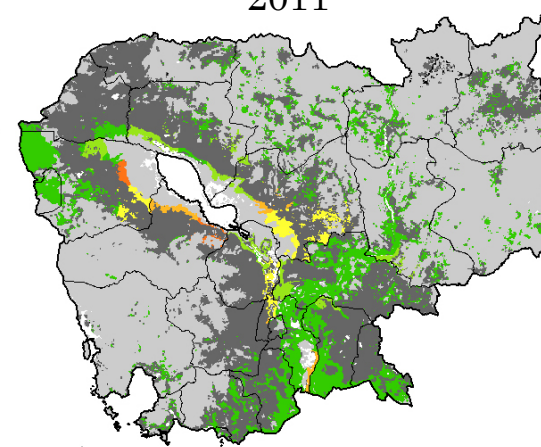
2017



2014



2011



Source: Food and Agriculture Organization 2018

Findings and Discussion — Cont.

Figure 13: Food production index (2004-2006 = 100)

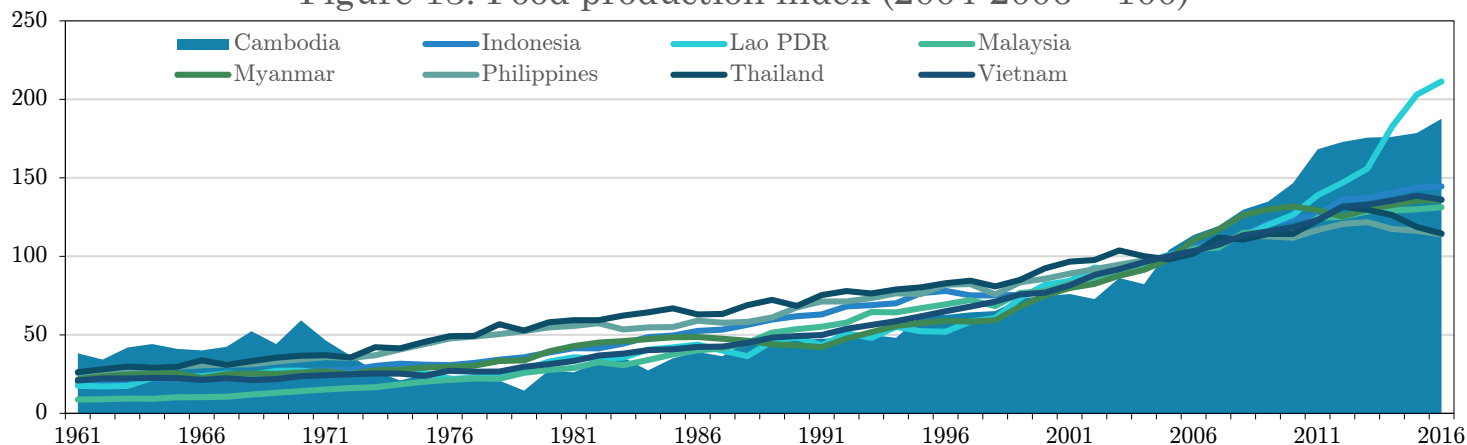
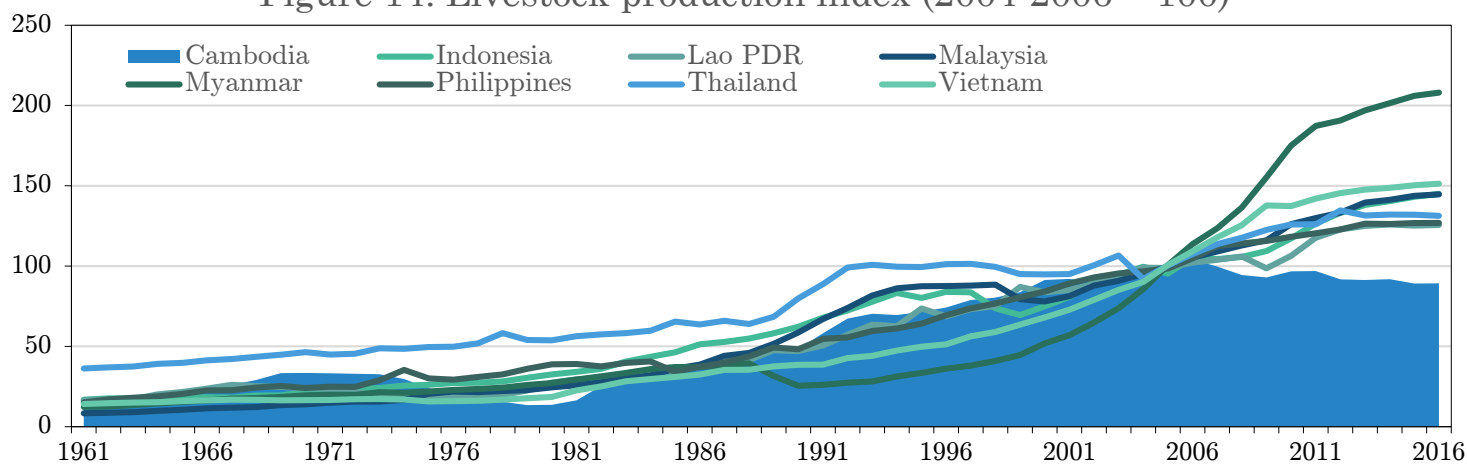


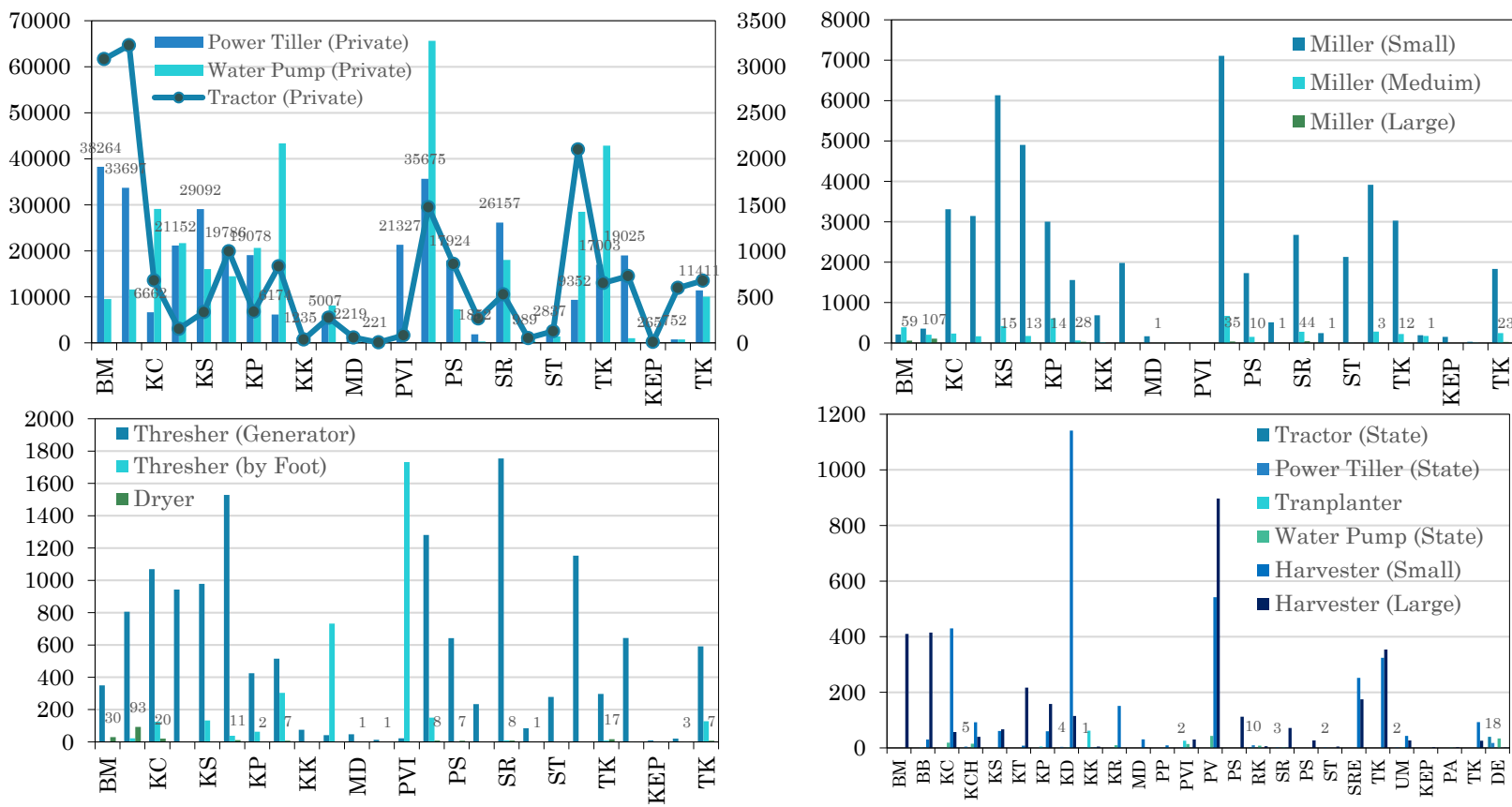
Figure 14: Livestock production index (2004-2006 = 100)



Source: World Development Indicators 2018

Findings and Discussion — Cont.

Figure 15: Farm Machines and Equipment 2016



Clarify : Rice miller small scale milling less than 55kg/h. Medium size milling 500-3000 Kg/h, Large size milling more than 3000Kg/h

Source: Ministry of Agriculture, Forestry and Fisheries

Findings and Discussion — Cont.

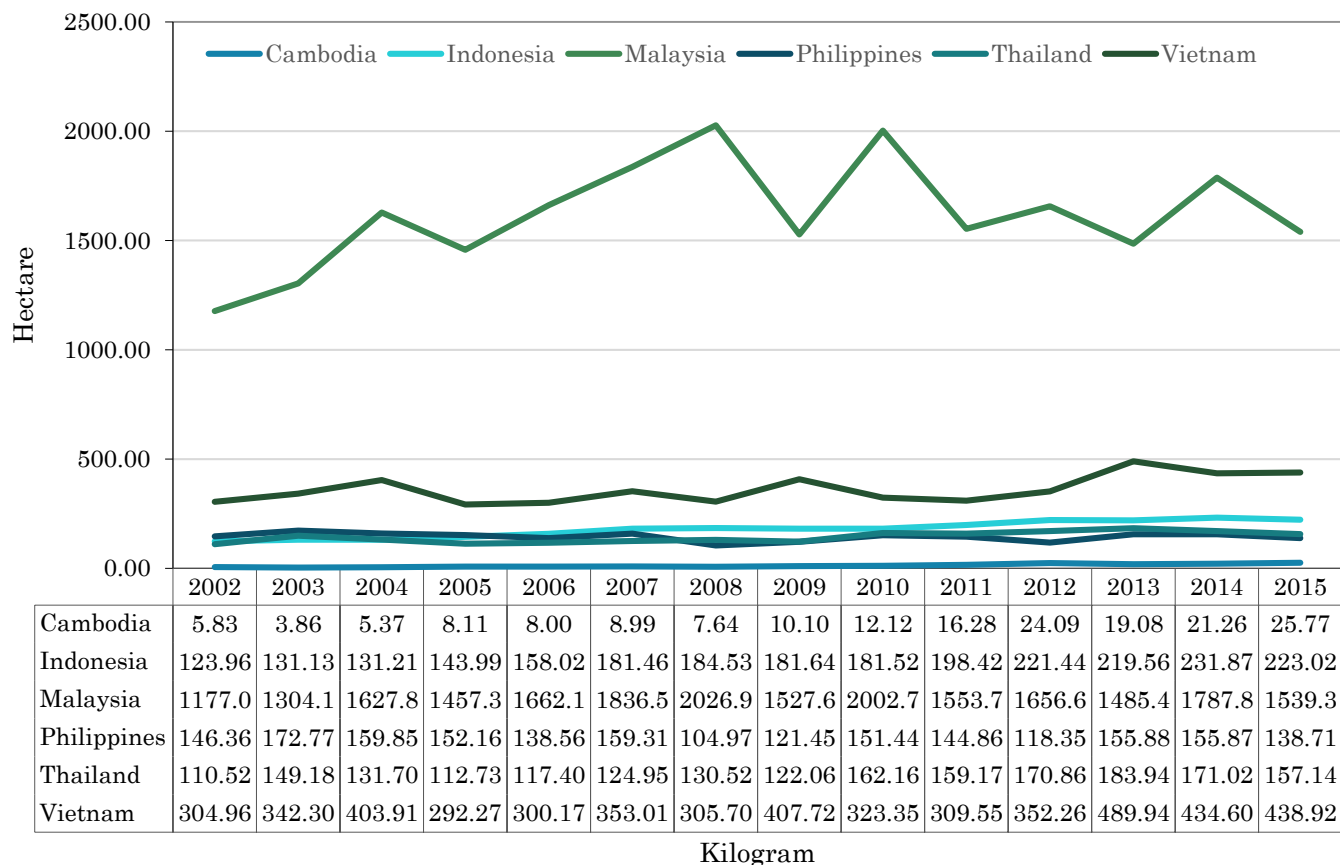
Table 2: Area of agricultural land by irrigation facilities and zone in 2016

Irrigation facilities	Cambodia	Phnom Penh	Plain	Tonle Sap	Coast	Plateau/ Mountain
Thousand hectares						
Irrigation during wet season	627	0	196	231	75	125
Irrigation during dry season	363	0	263	68	0	32
Irrigation during both seasons	255	0	153	42	30	30
No irrigation or water pump	2,114	1	527	881	136	569
TOTAL	3359	1	1139	1222	241	756
Percent						
Irrigation during wet season	18.7	33.4	17.2	18.9	31.1	16.5
Irrigation during dry season	10.8	0	23.1	5.6	0	4.3
Irrigation during both seasons	7.6	0	13.4	3.4	12.3	4
No irrigation or water pump	62.9	66.6	46.3	72.1	56.6	75.2
TOTAL	100	100	100	100	100	100

Source: National Institute of Statistics, MoP 2016

Findings and Discussion — Cont.

Figure 16: Fertilizer consumption



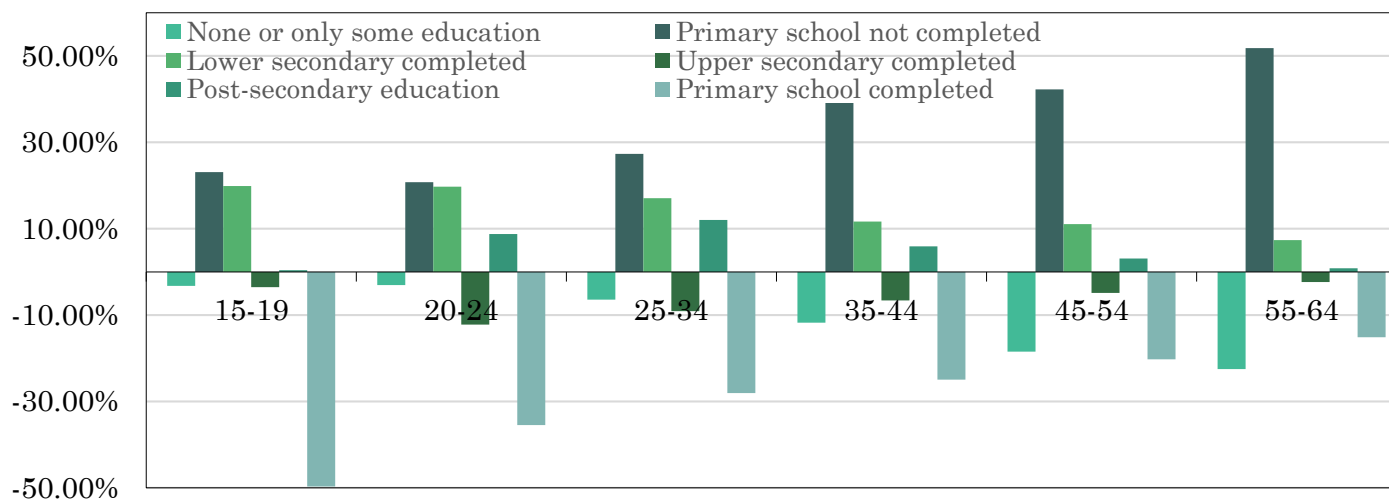
Source: World Development Indicators 2018

Findings and Discussion — Cont.

Table 3: Employed population 2016 (Number in Thousands and Percent)

Industrial sector (main occupation)	Number				Percent			
	Cambodia	Phnom Penh	Other urban	Other rural	Cambodia	Phnom Penh	Other urban	Other rural
Employed population	8,608	1,080	1,074	6,454	83.9	78.6	80.4	85.4
Agriculture (Primary)	3,130	11	133	2,987	36.4	1.0	12.4	46.3
Industry (Secondary)	2,291	281	284	1,724	26.6	26.0	26.5	26.7
Services (Tertiary)	3,187	789	657	1,742	37.0	73.0	61.1	27.0
Total	8,608	1,080	1,074	6,454	100	100	100	100

Figure 17: Education level of the labor force by age group 2016



Source: National Institute of Statistics: Cambodia Socio-Economic Survey 2016

Findings and Discussion — Cont.

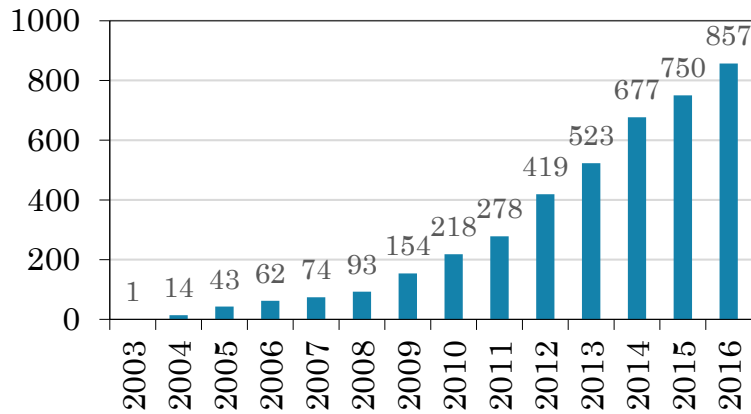
Table 4: The household Animal statistics in 2012-2016 (Heads)

No	Animal Types	2012	2012	2014	2015	2016	2015/2016
1	Cattle	3,372,212	3,425,952	3,053,481	2,903,420	2,897,126	-0.22%
2	Buffaloes	656,938	619,114	541,827	506,165	523,320	3.39%
3	Cattle Buffaloes	4,029,150	4,045,066	3,595,308	3,409,585	3,420,446	0.32%
4	Draft Animal	1,516,110	1,344,541	1,249,817	1,132,097	1,051,625	-7.11%
5	Pigs	1,952,321	2,067,975	2,360,027	26,688,675	2,371,283	0.57%
6	Poultry	19,374,139	21,429,519	25,630,027	26,688,675	28,402,486	6.42%
7	Horse	12,394	10,850	9,161	7,637	5,610	-26.54%
8	Sheep	174	100	238	378	400	5.82%
9	Goat	11,995	15,831	18,256	23,321	22,719	-2.58%
10	Elephants	64	64	63	64	63	-1.56%
	TOTAL	25,380,237	27,569,405	31,613,876	32,487,499	34,223,007	5.34%

Source: Ministry of Agriculture, Forestry and Fisheries

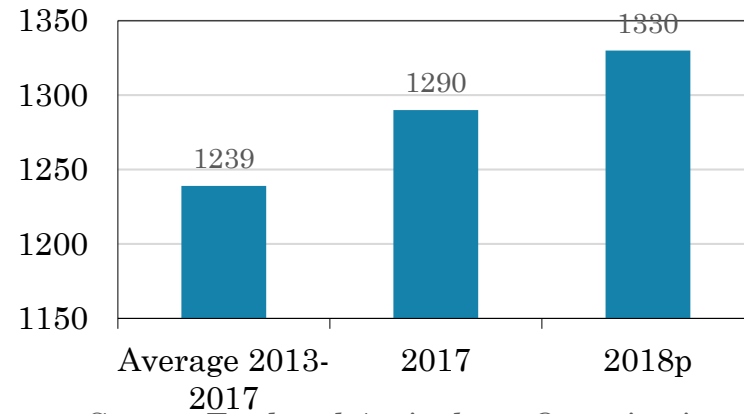
Findings and Discussion — Cont.

Figure 18: Number Agricultural Cooperative



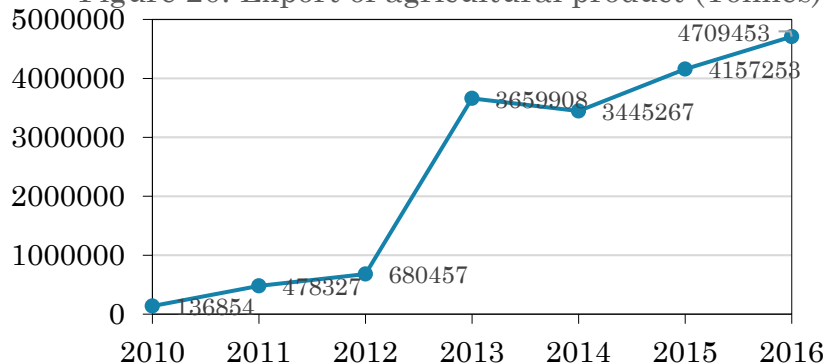
Source: Ministry of Agriculture, Forestry and Fisheries

Figure 19: Cambodia rice exports



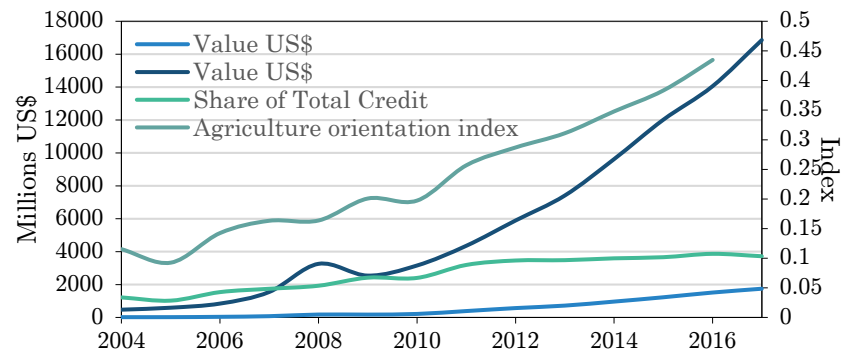
Source: Food and Agriculture Organization 2018

Figure 20: Export of agricultural product (Tonnes)



Source: Ministry of Agriculture, Forestry and Fisheries

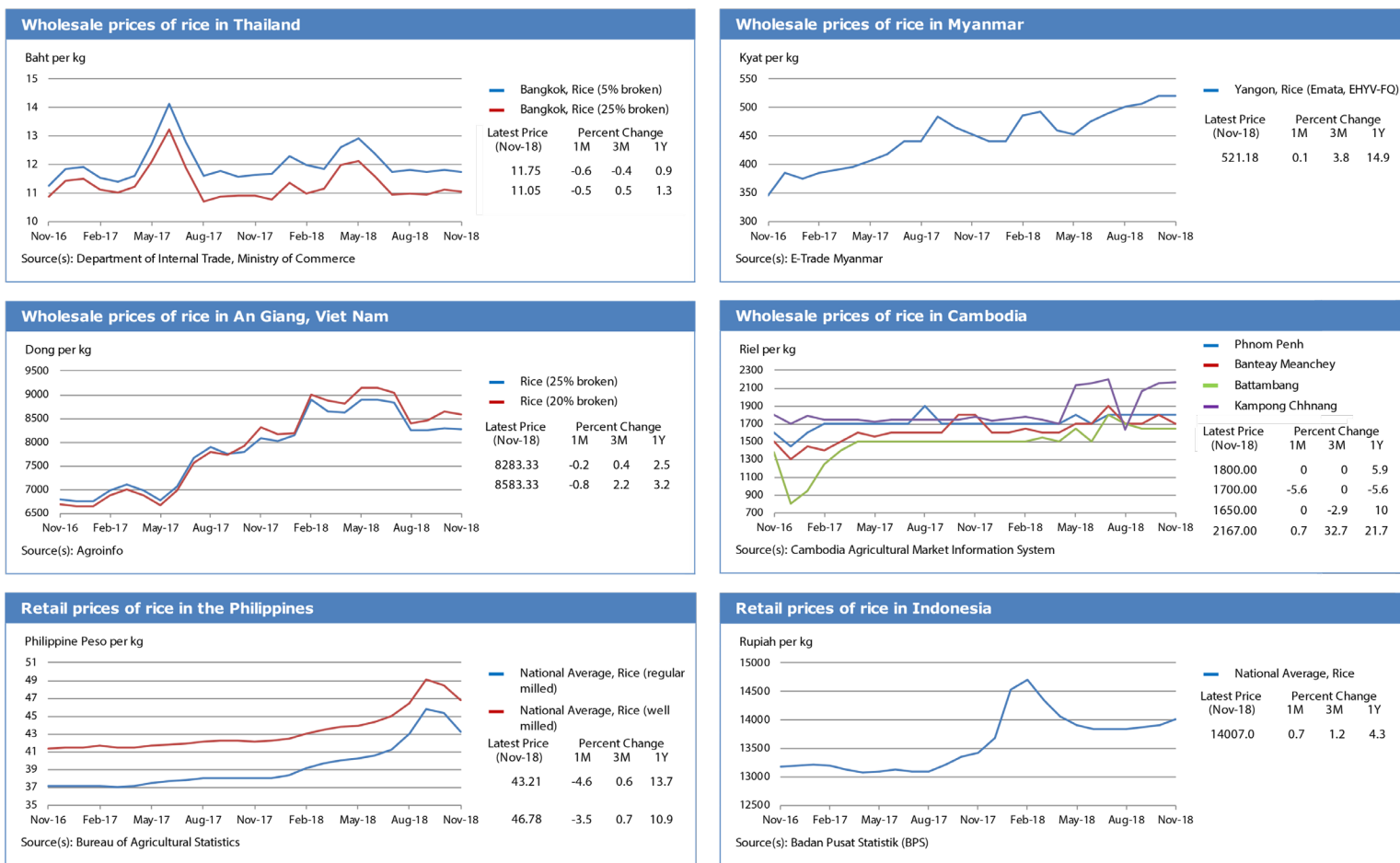
Figure 21: Credit to Agriculture, Forestry and Fishing



Source: Food and Agriculture Organization 2018

Findings and Discussion — Cont.

Figure 22: Domestic prices of rice mostly unchanged



Source: Food and Agriculture Organization 2018

Table 5: Summary Findings

Summary Findings	
Productivity	The productivity is rose gradually from year to year
Technique	Levels of technical is low
Fertilizer	The fertilizer was limited, if we compare to our neighbor countries
Technology	Better
Infrastructure	Better
Production Costs	Still a challenge for farmer
Market	Still a big challenge of farmers who have small property
Climate change	It's not a big challenge of Cambodian agriculture

Conclusion and Policy Implications

In order to change Cambodian agriculture to the intensive, we have to promote educational farmer, crops and livestock, technology.

Improve existed infrastructure to make an opportunity that every farmer can use it.

The agricultural products market is also the main point to attention to make people work in this sector has more confidence.

Investments and policy improvements are needed immediately. Some of these will take more time and effort to have an impact on the ground.

Conclusion and Policy Implications — Cont.

- **Community Technical Experts** : The expert must work closely with farmers in each community.
- **Building Agricultural Infrastructure** : In addition to repairing existing agricultural infrastructure, the government must build new agricultural infrastructure in areas where it is necessary though irrigation system and transportation system.
- **Agricultural Research Team** : Research and development, technology and innovation, international market, and climate change.

Conclusion and Policy Implications — Cont.

- **Set Prices for Agricultural Products:** The specialist must analyze and evaluate agricultural products prices by the seasonal, by the crop type and livestock type.
- Maintain a private sector friendly policy environment, particularly reduce the regulatory burden in farm input sectors such as **seeds** and **fertilizers**.
- Strengthen the **environmental sustainability** of agricultural production.
- **Collecting Farmers' Agricultural Outputs:** When prices of agricultural commodities are declining, the government plays as a key role in solving this problem through a policy of collecting agricultural products directly from farmers for stocks to be sold as agricultural yields rise.

Thank You!