The Development of Sustainable Rice Farming through Agricultural Cooperatives in Cambodia- Case Study in Prey Kabbas, Takeo Province

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Background of Study

- From civil war to a peaceful and developing country
- With economic growth around 7% per annum
- Agricultural sector contributes to the GDP around 20.7 % (NIS, 2019)
- From a food insufficiency to an export country
- Won the title of “World Best Rice” for 4 years; 2012, 2013, 2014, and 2018.

Modern Cambodian Agriculture

Modern Cambodian Agriculture:

- Productivity gains were possible with increased planted land and use of agricultural inputs– Overly use of agrochemical products

Current Challenges:

- Creating environmental hazard, health risks
  + Exposed to weather shocks (shorter rainy season and longer and drier dry season)
- Unnecessary expense on pesticide
- Rising cost of production- Vulnerable to poor farmers

Negative impacts push farmers to practice more sustainable agricultural systems: IPM, low-input cultivation systems such as SRI, and organic.

Source: World Bank Report , 2015

WORLD BANK GROUP

“Strengthening Sustainable Agriculture in Needed For Future Agriculture Growth in Cambodia” – World Bank Report (2015)

The **concept of sustainable farming is still unfamiliar and difficult to most Cambodian farmers.**




Supported Organizations for Sustainable Farming

Both Royal Government of Cambodian and several private sectors- Actively promoting sustainable agriculture in Cambodia

- Since 1999- Provided Systematic Rice Intensification **(SRI)** Technique
- From 2002- Formed **organic rice producer group**, and create the market
- Supplied to local market and international market (EU, USA…)

Source: FNN report (2011)

Organic Rice in Cambodia

Table 1: Trend of Organic Rice Production

	2013	2016	2020
Farmers	100	2,500	10,000
Cooperatives	2	18	35
Organic rice sold (metric tones)	100	11,000	30,000

- The demand for organic products is significantly increasing due to the increasing numbers of people who prefer a better healthy and safe lifestyle.
- Organic agricultural land in Cambodia is growing annually.
- Despite number of farmers are increasing, still there are some reported that many organic farmers reverted to conventional farming.

Source: AMRU Rice, 2013

Promoting sustainable farming to farmers

- More than 50% of study farmers know the concept of sustainable farming.
- Nearly half of them got to know more about SF through Agricultural Cooperative.
- According to ILO and ICA, 2016- **agriculture Cooperatives** are highly relevant and important in the realization of the sustainable agriculture development.
- Only few ACs in Cambodia are supported this movement.
- Some cooperatives are successful whereas others are not.

Table 2: Level of Understanding Sustainable Farming

Count of respondents			
	Conventional	Partially organic	Total
Understand	9	19	28
Don't know	21	6	27
Total	30	25	55
Chi square value		9.78*	

**Indicates statistical significance at 0.05 level*

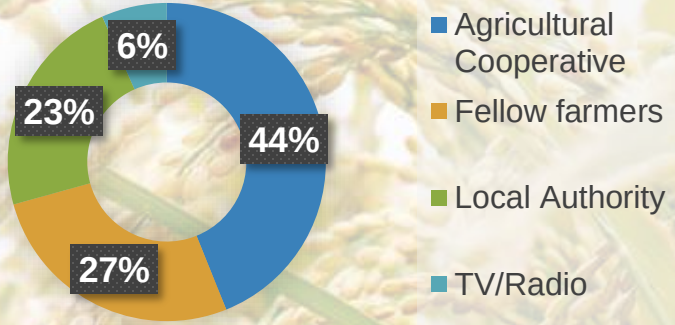

Figure 1: Sources of Information relating to Sustainable Farming

Source: Field survey, 2018

Research Objectives

The study examines the contributions of agricultural cooperatives and constraints to promote sustainable farming to improve farmers' livelihood.

Specially aims to,

1. Determine the socio-economic characteristics between ACs members and non-members.
2. Identify the contributions of agricultural cooperatives to promote sustainable farming to farm members
3. Challenges of agricultural cooperatives

Sample Selection

- Survey was conducted: July 1st to August 1st , 2019
- By author and several assistants
- Chosen through random sampling method and semi-structure interviewed based

Table 3: Numbers of interviewed respondents

	Respondents
Reusey Rong Rong Reung AC	30
Chomnoum Chomreun Phal AC	30
Sdok Sdom AC	30
Non-members	50
Total	140

(Unit: respondents)

General Profile of Study Agricultural Cooperatives

Table 4: Characteristics of Study Agricultural Cooperatives

	R.R AC	C.C AC	S.S AC
Establishment years (years)	2014	2013	2013
Initial members (members)	131	12	61
Current members (members)	145	70	265
Current capital (USD)	12,500	36,000	650,000
Initial members fee (USD)	0	0	0
Share (USD/share)	25	25	25

Source: Field Survey, 2019

General Profile of Study Agricultural Cooperatives

R.R. AC Services	C.C. AC Services	S.S. AC Services
+ Loans and Savings + Provide low-cost seed and fertilizers + Link vegetable farmers to buyers + Buy and sell paddy	+ Loans and Savings + Provide low-cost seed and bio liquid fertilizers	+ Loans and Saving + Provide low-cost seed and organic fertilizers + Buy paddy + Rice milling + Sell milled rice to Urban area + Sell self produced goods such as rice wine and animal feeds

Farmers' Characteristics

Table 5: Socio-Economic Characteristics of Studied AC Member and Non-Members

	AC members	Non- members	T-test (t stat)	
Numbers of households (HH)	90	50		
Average family size (person)	4.63	3.89	2.90	*
Average age (years old)	51.24	49.89	0.48	
Years of education (years)	7.87	6.58	2.11	*
Years of farming experience (years)	31.13	28.42	0.97	
Average planted area per HH (ha)	1.01	1.05	-0.12	
Average numbers of owned cattle (heads)	1.3	0.64	2.42	*

Source: Field survey, 2019 **Indicates statistical significance at 0.05 level*

- ACs members have bigger family size with small plot of land.

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ACs members found to obtain relatively higher education and owned more cattle.

Expected to adopt sustainable farming technique easier than non-members.

Costs and Returns of Rice Farming

Gross revenue = Yield * Paddy price

Gross Margin = Gross Revenue - Total Cash Expense

Table 6: Costs and returns of rice farming categorized by members and non-members

Variables	Mean score of AC member	Mean Score of Non-member	T-test (T-stat)	
Number of HH (HH)	90	50		
Paddy yield (ton/ha)	3.73	3.58	0.63	
Paddy price (USD/ton)	293.31	275.51	1.38	**
Paid material cost	121.59	139.786	-1.33	**
Total labor cost	249.78	161.69	2.83	*
Total services cost	145.30	178.97	-2.28	*
Cash land rent	6.77	0	1.79	*
Total cash expense	301.03	332.37	-1.55	**
Total expense	738.14	667.08	1.74	**
Gross revenue	1094.05	977.33.	2.10	*
Gross margin	**754.99**	**599.93**	**2.56**	*

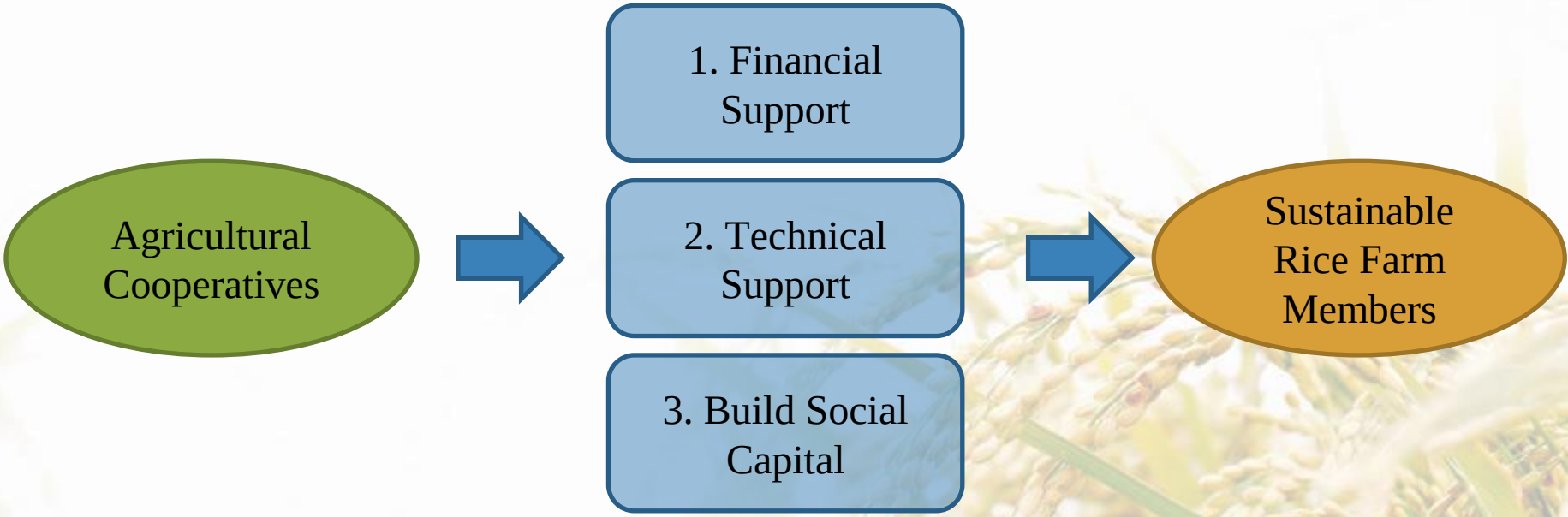
Source: Field survey, 2019

*p<.05, **p< .01

Unit: USD/ha

- Although, there is no significant difference in yield, ACs members is likely to ensure better profits than non-members.
- Differences in expenses could also attributed from being the membership of ACs.

Contributions of agricultural cooperatives to promote sustainable farming to members



Financial Support-
Easier and Cheaper to access to credit

Table 7: Access to credit between AC and non AC members

Type of Credit	Member (n=90)	Non-Member (n= 50)
Formal	**100 (100%)**	**23 (46%)**
• Banks	2 (2%)	2 (9%)
• MFIs	8 (9%)	9 (39%)
• Cooperatives	80 (89%)	12 (52%)
Informal	**-**	**27 (54%)**
• Relatives/Neighbors	-	2 (7%)
• Input Supply Stores	-	25 (93%)

Source: Field survey, 2019

Note: * The loan interest rate of Banks and MFIs is around 1.5% - 1.8% monthly, while agricultural cooperatives are from 1% - 1.3% monthly.

- Greater access to credit will lead to higher agricultural output (Francis O. et al., 2019 and K. Sothorn, 2020.
- ACs members access to credit more.
- ACs require no collaterals with smaller interest rate, locate nearer to farmers' house, and provide timely payment.

Financial Support-
Advantage to low natural farm inputs cost

- High input cost has been identified as major constraints for farmers.
- ACs have provided fertilizers (natural fertilizers) and highly resistant seeds to farmers at lower prices to ensure farmers' profitability.

Financial Support-
Advantage to natural fertilizer

Natural fertilizer: available at R.R AC and S.S AC

Natural fertilizer- certified from JAS

Bio fertilizer- C.C AC

Certified from MAFF- liquid type

Natural fertilizer	Chemical fertilizer
22.5 $	20-30

30 USD/ bottle of 4 litres

Financial Support- Advantage to quality high resistant seed

- To cope with climate change and introducing sustainable rice farming to farmers, Royal Government of Cambodia have collaborated with all ACs in the study area to promote their recommended rice variety with subsidy intervention.
- Rice seed- Aromatic and medium maturity type
  High resistance to flood and pests compare to irrigated type of rice
  High yield (3.5 ton/ha to 5.5 ton/ha) and premium price
  Win World Best Rice for 3 executive years

The price of seed sold outside ACs is **2,600 KHR/kg**

Seed sold in wholesale to ACs- only **1,600KHR/kg**
AC sell in retail to farmers- **1,800 KHR/kg**
(200 KHR/kg profit)

Financial Support

- This bio-gas projected inside AC, so ACs members can easily access and utilize this invention.
- Members who wish to install this, will receive 150 USD subsidy for installment and low interest rate (1.2%) for loan.
- Energy of this biogas can be used as compost for crops, gas for cooking and energy for electricity.
- By using this bio-gas, farmers are estimated to save at least 1 million KHR/year by MAFF.

Financial Support- Access to farm input

Table 8: Cost of Farm Input between AC members and Non-members Unit: USD/ha

Item	Mean score of AC member	Mean score of Non-member	T-test (T-stat)	
Number of HH (HH)	90	50		
Paid purchased seed	4.22	11.83	1.62	
Chemical fertilizer	32.02	53.19	-2.77	*
Paid organic fertilizer	40.33	8.41	*2.86*	*
Pesticide	7.68	18.12	-2.79	*
Weedicide	10.50	21.97	-3.95	*
BC Cost	***145.83***	***194.39***	***-4.39***	*

Source: Field survey, 2019

**Indicates statistical significance at 0.05 level*

- Member farmers spent on seed and fertilizer 30% cheaper compare to non-members.

Technical Support

- Training is very necessary to enhance farmers' knowledge development (K.L. Meena and P. Chowdhury, 2016)
- From previous study, farmers express their limit knowledge to sustainable farming technique.
- **Training and demonstration from AC board members** plays an important role to introduce and spread sustainable farming knowledge to members.

Technical Support

Training Subject	Detailed Contents	AC Members (%)	Non AC members (%)	P value (F-test)
Soil Managment	Conservation tillage Mulches, cover crops	43	0	-
	Compost making	60	32	0.37
Pest, weed, and disease management	Selection of high resistant seed IPM Intercropping and crop rotation	63	30	0.36
Livestock management	Animal vaccination, feeds and cage or pen	23	6	1.41E-05*
Safety use of agrochemical	Hazardous and proper use of agrochemcials	76	15	1.59E-08*

**Indicates statistical significance at 0.05 level*

Source: Field survey, 2019

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- AC members found to receive more training focus on praticing farming in the sustainable way.
- Especially, the technique of livestock management and harmfulness of utilizing agrochemical product.
- ACs members utilize more natural fertilizer (animal manure, compost, and natural fertilizer).
- To avoid insecticide application, they practiced IPM techniques, while non-members relied totally on insecticide.

Source: Field survey, 2019

Build Social Capital

1. Direct relationship: Between AC members and supported institutes

- MAFF and others supported institutes are generally the parents to the AC.

Table 9: Collaboration score between AC and related institutes

Type of institutes	R.R AC	C.C AC	S.S AC
MAFF	3.33	3.67	4.33
Provincial authority	4.33	4.00	4.00
Commune and Village authority	4.33	4.00	3.67
Other related institutes	3.67	5.33	4.33
Average score	3.92	4.00	4.08

Source: Field survey, 2019

- Good establishment could benefits members with both knowledge development and financial subsidize.
- Members felt more assure to have closer relationship with local authority as well.

Build Social Capital

2. Indirect relationship: Within AC members and Consumers

Organic goods such as rice, vegetables, rice wine

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Network Establishment

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Marketing Info such as price, demand goods, feedback, etc.

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- This marketing information is privilege for ACs that make their own delivery to the store directly, while most non-members don't have.
- Members found to have more accurate and faster information than non-members.
- Although, ACs members share the same marketing information, but only those who produce organically received better price negotiation.

Build Social Capital

2. Indirect relationship: Between AC members and natural fertilizer company

Farm input: natural fertilizer, & training

Farm input: natural fertilizer, & training

- Partnerships and collaboration are built to achieve better products at lower cost and training related to farming technique with less use of agrochemical products.

Challenges of ACs

Table 10: Challenges affecting the performance of ACs

Challenges	Responses from ACs member		
	Yes	No	DK
Shortage of capital and credit facilities	81%	19%	0
Poor marketing	79%	11%	0
Impractical knowledge and technique provided by supporting agencies	78%	22%	0
Limit of organic farm input materials	70%	30%	0
Members' illiteracy	55%	44%	0
Doesn't respond to members' needs	53%	41%	6%
Lack of members' participation	52%	48%	0
Lack of leadership and work capability	49%	50%	1%
Poor bookkeeping/financial management	47%	43%	0
Poor enforcement of internal regulation	47%	39%	4%
Poor communication with local authority	28%	58%	14%

Source: Field survey, 2019

Challenges of ACs

Lack of financial and credit facilities

- Small deposit from members
- Late payments from members
- Not well profit functioning from ACs businesses yet

Saving capital of ACs could not meet the needs of their members

Poor marketing power and impractical farm knowledge

- Some techniques are inapplicable to farmers
- No niche market for sustainable rice farming except organic rice
- Distribution share of organic product to market is still small; mainly target domestic market

Illiteracy and limited knowledge of members

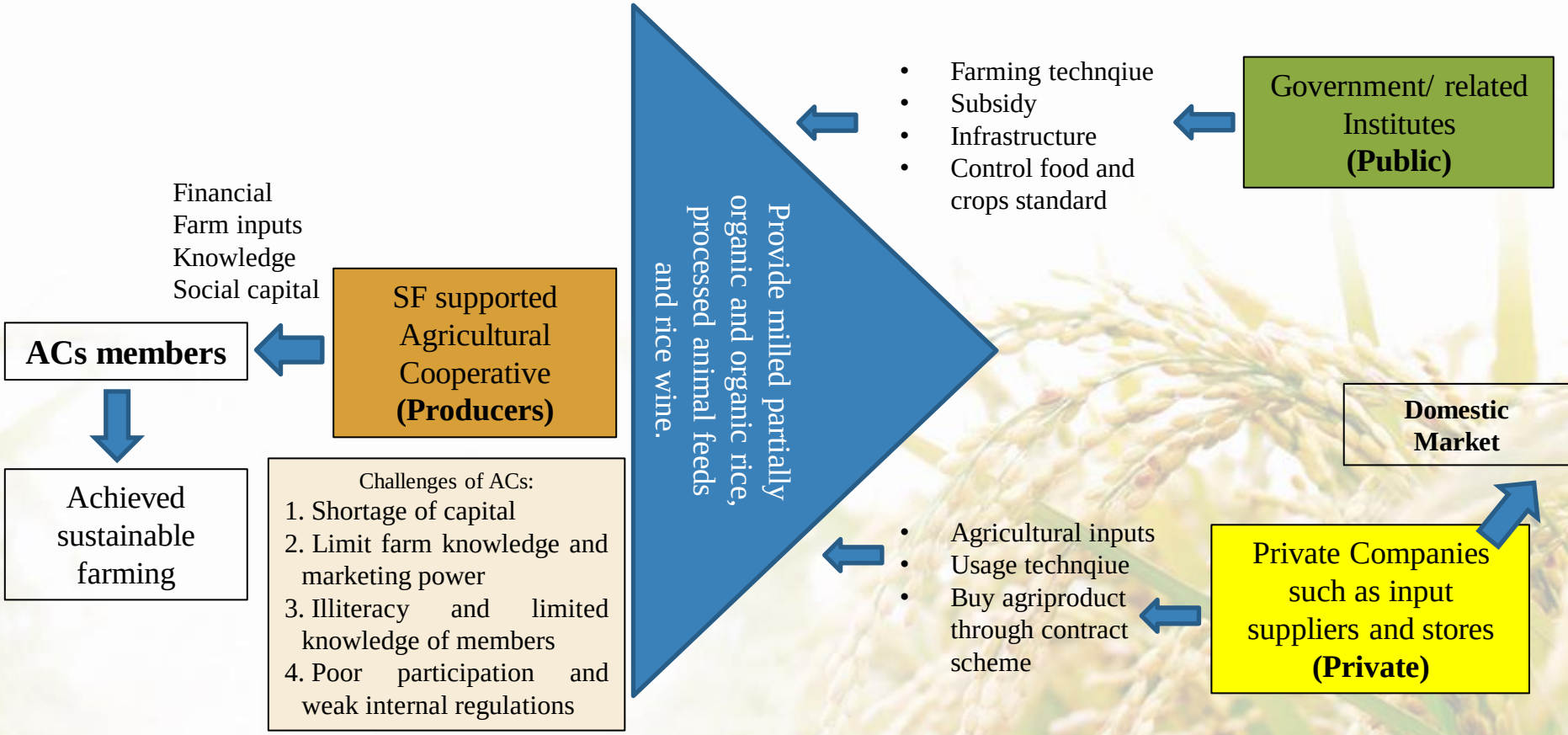
- Management members are old and low education level.
- Poor internal function - bookkeeping, leadership, communication, facilitation and farming techniques, agribusiness management.

Limited participation from members and weak enfocement of internal regulations

- Lack of members' participant.
- Repay money late
- Management was too intimate with members and scare to displease and lose the membership.

Conclusion

- Although there was no differences in paddy yield, but by utilizing more natural resources and the privileges of being the part of ACs memberships, members ensure better profit than non-members.



Recommendations

Organization capacity

- Set priority on internal capacity building
- Recruit more young officers with some level of education

Manage financial capital

- Set negotiation with banks or MFIs for rural credit with lower interest rates
- Raise up memberships and saving capital
- Promote and advertise ACs' activities

Farming technique and marketing

- Set own strategy and find more market opportunities
- Provide effective and practical farming technique to members

Subsidy and supports from others' institutions

- Not to depend heavily on external supports
- Expand itself to be like other development key players
- Seek and negotiate with private investors to help sustain ACs operation

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