TECHNICAL WORKING PAPER

CAMBODIA

IMPACT ASSESSMENT OF FARMER ORGANIZATIONS ON FOOD SECURITY FOR RURAL POOR

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Agriculture Global Practice

East Asia and Pacific Region

Acknowledgments

The Impact Assessment of Farmer Organizations on Food Security for rural Poor is conducted by Cambodia Development Resource Institute's (CDRI) Assessment team including Theng Vuthy, Keo Socheat, Nou Keosothea, Sum Sreymom and Khiev Pirom.

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Acronyms & Abbreviations

AC	Agricultural Cooperative
ATT	Average Treatment Effect on the Treated
CBO	Community Based Organisation
CEDAC	Centre for Study and Development in Agriculture of Cambodia
FA	Farmer Association
FAO	Food and Agriculture Organisation
FC	Farmer Community
FF	Farmer Federation
FG	Farmer Group
FGD	Focus Group Discussion
FO	Farmer Organisation
FWUC	Farmer Water User Community
HH	Household
HHH	Head of Household
INGO	International Non Government Organisation
IVY	International Volunteer Yamagata
KII	Key Informant Interview
LNGO	Local Non Government Organisation
MAFF	Ministry of Agriculture, Forestry and Fisheries
MFI	Micro Finance Institute
MoC	Ministry of Commerce
MoI	Ministry of Interior
NGO	Non Government Organisation
NSDP	National Strategic Development Plan
OAE	Office of Agricultural Extension
PDA	Provisional Department of Agriculture
PSM	Propensity Score Matching
RS	Rectangular Strategy
SAW	Strategy for Agriculture and Water
SHG	Self-help Group
SRI	System of Rice Intensification
WB	World Bank

Contents

សេចក្ដីសង្ខេបរួម

របាយការណ៍នេះធ្វើការវាយតម្លៃលើឥទ្ធិពល ដែលការចូលរួមនៅក្នុងអង្គការកសិករ មានមកលើសន្តិសុខស្បៀងរបស់ប្រជាពលរដ្ឋនៅជនបទក្នុងប្រទេសកម្ពុជា។ ការសិក្សានេះមាន គោលបំណងពិសេស ដូចតទៅ ៖ ១) ពិនិត្យលើតួនាទី និងប្រតិបត្តិការរបស់អង្គការកសិករ ក៏ដូចជា បញ្ហាប្រឈម ចំពោះការបង្កើនសន្តិសុខស្បៀងនៅតាមគ្រួសារ ២) ធ្វើការវិភាគលើ លក្ខណៈរបស់គ្រួសារ ដែលកំណត់ពីការចូលរួមរបស់ពួកគេនៅក្នុងអង្គការកសិករ ៣) វាយតម្លៃលើឥទ្ធិពលដែលអង្គការកសិករមានមកលើសន្តិសុខស្បៀង និងជីវភាពរស់នៅរបស់ប្រជាពលរដ្ឋក្រីក្រដែលរស់នៅតាមទីជនបទ និង ៤) ផ្ដល់អនុសាសន៍ជាក់លាក់អំពីការផ្លាស់ប្ដូរ នៅក្នុងច្បាប់ និង ក្របខ័ណ្ឌលិខិតបទដ្ឋានគតិយុត្ដិ ដែលពាក់ព័ន្ធនឹងអង្គការកសិករ។

ការសិក្សានេះផ្ដោតលើអង្គការកសិករចំនួន ៣ ប្រភេទ ទៅតាមចំនួនរបស់អង្គការទាំងនេះ នៅក្នុងប្រទេសកម្ពុជា។ ក្រុមកសិករ គឺជាក្រុមដែលប្រមូលផ្ដុំគ្នាក្រៅផ្លូវការមានសមាជិកពី ១០ ទៅ ៣០ នាក់។ សមាគមកសិករមានសមាជិកលើសពី ៣០ នាក់ និងអាចមានលក្ខណៈក្រៅផ្លូវការ ឬ ផ្លូវការ ប្រសិនបើចុះបញ្ជីជាមួយនឹងក្រសួងមហាផ្ទៃ។ សហករណ៍កសិកម្ម មានទិសដៅផ្ដោតលើ ការធ្វើអាជីវកម្ម ចុះបញ្ជីនៅមន្ទីរកសិកម្ម ហើយជាទូទៅ មានសមាជិកលើសពី ៣០ នាក់។

ព័ត៌មានបែបគុណវិស័យត្រូវបានប្រមូលចេញពីការពិភាក្សាក្រុមគោលដៅ ដើម្បីកំណត់ពី តួនាទី និងដំណើរការរបស់អង្គការកសិករ និងបញ្ហាប្រឈម ដែលពួកគេជួបប្រទះ។ ការពិភាក្សា ជាមួយនឹងសមាជិករបស់អង្គការកសិករ និងការសម្ភាសជាមួយនឹងអ្នកពាក់ព័ន្ធដែលជាអ្នកអាចផ្ដល់ព័ត៌មានសំខាន់ៗ ធ្វើឡើងនៅក្នុងខេត្តចំនួន ៤ (ខេត្តកំពត កំពង់ធំ បាត់ដំបង និងស្វាយរៀង) ជាខេត្ត ដែលមានដង់ស៊ីតេអង្គការកសិករដែលដំណើរការខ្ពស់។

ដោយឡែកសម្រាប់ទិន្នន័យបែបបរិមាណវិញ បច្ចេកទេសផ្គូរផ្គងពិន្ទុឧបនិស្ស័យ (propensity score matching - PSM)[1]

ត្រូវបានបង្កើតឡើង ដើម្បីវាយតម្លៃលើឥទ្ធិពលដែលការចូលរួមនៅក្នុងអង្គការកសិករមានមកលើសន្តិសុខស្បៀង។
ទិន្នន័យអង្កេតឆ្លងផ្នែកលើប្រជាពលរដ្ឋ ប្រមាណជា ៣៣០ គ្រួសារ ដែលជាសមាជិករបស់អង្គការកសិករ ដែលត្រូវបានជ្រើសរើសពីអង្គការកសិករទាំង ៣ ប្រភេទ (ពោលគឺក្រុមកសិករ សមាគមកសិករ និងសហករណ៍កសិកម្ម ក្នុង សមាមាត្រ ៥០:៣០:២០ ភាគរយ) ហើយមានគ្រួសារចំនួន ៣៦៩ ត្រូវបានជ្រើសរើសចេញពីតាមភូមិដូចៗគ្នា របស់ឃុំដែលបានជ្រើសរើស ដោយប្រើប្រាស់វិធីសាស្ត្ររៀបចំសំណាកតាមបែបចៃដន្យ ក្នុងលក្ខខណ្ឌជាប្រព័ន្ធ ដើម្បីបង្កើតនូវក្រុមពុំមានអន្តរាគមន៍ សម្រាប់ធ្វើការផ្ទៀងផ្ទាត់ជាមួយ។

រដ្ឋាភិបាលកម្ពុជាជម្រុញឱ្យមានការបង្កើនការនាំចេញអង្ករ តាមរយៈការបង្កើតនូវអង្គការ កសិករ

នៅក្នុងប្រទេសកម្ពុជា មានប្រជាពលរដ្ឋកក្រីក្រជាង ៩០ ភាគរយ ដែលរស់នៅតាមតំបន់ ជនបទ និងពឹងផ្អែកលើការងារកសិកម្ម ជាប្រភពចម្បងសម្រាប់ចិញ្ចឹមជីវិត។ ហេដ្ឋារចនាសម្ព័ន្ធ ដែលមានភាពទន់ខ្សោយ (ជាពិសេស ប្រព័ន្ធធារាសាស្ត្រ និងហេដ្ឋារចនាសម្ព័ន្ធជនបទ) ការពុំមាន កម្មសិទ្ធិដីធ្លីបានជាប់លាប់ និងការពុំមានលទ្ធភាពគ្រប់គ្រាន់ ដើម្បីទទួលបានបច្ចេកវិទ្យា និងសេវាផ្សព្វផ្សាយកសិកម្ម គឺជាបញ្ហាប្រឈមចម្បងៗ ដែលកសិករខ្មែរតែងជួបប្រទះនាពេលបច្ចុប្បន្ននេះ។ លើសពីនេះ លទ្ធភាពទទួលបានឥណទានក្នុងកម្រិតទាប ព័ត៌មានីផ្សារដែលមិនអាចជឿទុកចិត្តបាន និងការវិនិយោគសាធារណៈទាបលើវិស័យកសិកម្ម គឺជាកត្តា ដែលរាក់កំហិតលើការអភិវឌ្ឍពិតប្រាកដនៃវិស័យកសិពាណិជ្ជកម្ម ជាទូទៅ។ នៅពេលមិនមានកិច្ចសហប្រតិបត្តិការ និងការអនុវត្តសកម្មភាពជាសមូហភាព កសិករនៅកម្ពុជានៅកម្រិតបុគ្គលមិនអាចដោះស្រាយចំណុចខ្វះខាតទាំងនេះប្រកបដោយប្រសិទ្ធភាពបានឡើយ។

រដ្ឋាភិបាលកម្ពុជាបានកំណត់តួនាទីរបស់អង្គការកសិករថាមានសារៈសំខាន់ ចំពោះការបង្កើនផលិតភាពកសិកម្ម និងលើកកម្ពស់សន្តិសុខស្បៀង តាមរយៈការបង្កើនកិច្ចសហប្រតិបត្តិការឱ្យបានកាន់តែជិតស្និទ្ធជាមួយនឹងវិស័យឯកជន។ នៅក្នុងឆ្នាំ ២០០១

ព្រះរាជកិត្តិយសដ៏ពីសហករណ៍កសិកម្ម តម្រូវបានចញ្ចៀ
និងមានការទទួលស្គាល់តាមផ្លូវច្បាប់លើអង្គការកសិករ និងសហករណ៍កសិកម្ម។
ចាប់តាំងពីពេលនោះមក អង្គការមិនមនែរដ្ឋាភិបាល និងអង្គការអភិវឌ្ឍន៍ជាច្រើន បាន
បង្កើតអង្គការកសិករនៅតាមតំបន់ជនបទ ដើម្បីអនុវត្តកម្មវិធីអភិវឌ្ឍន៍របស់ខ្លួន។
ខណៈពេលដែលអង្គការមិនមនែរដ្ឋាភិបាល
និងវិស័យសាធារណៈកំពុងផ្តល់ការគាំទ្រយ៉ាងសកម្មដល់ដំណើរការរបស់អង្គការកសិករ
ការចូលរួមរបស់វិស័យឯកជននៅតែខ្វះខាតនៅឡើយ។

**បសេកកម្មថម្បងរបស់អង្គការកសិករ គឺជម្រុញ
និងគ្រប់គ្រងការសន្សំបម្រាក់ និងផ្តល់នូវ ឥណទានឱ្យសមាជិក
សម្រាប់យកទៅវិនិយោគលើផលិតកម្មកសិកម្មរបស់ខ្លួន។** អង្គការកសិករក៏
បានដាក់ឱ្យអនុវត្តដនូវបច្ចេកទសេកសិកម្មថ្មីៗ
និងបានផ្តល់នូវការគាំទ្រជាធនធានមិនមនែសាច់បម្រាក់ ដូចជា ដំណាំ និងសត្វជាដើម។
សកម្មភាពរួម ដើម្បីគាំទ្រដល់ការទទួលបានធនធានទូទៅ (ដូចជា ឧបករណ៍សម្ភារ ជី
គ្រាប់ពូជ សត្វ) និងដើម្បីទទួលបានទីផ្សារ នៅមិនទាន់មាននៅឡើយ
ដោយហតេុថាសមាជិកភាគច្រើនរបស់អង្គការកសិករទិញធនធាន
និងលក់កសិផលរបស់ខ្លួនរៀងៗខ្លួន។

**បនា្ទមពីលើការផ្តល់ឱកាសទទួលបានឥណទាន
ដែលមានលកខ្ខណៈអំណោយផល
អត្ថបប្រយោជន៍ដែលអាចទទួលបានពីការចូលជាសមាជិករបស់អង្គការកសិករ
រួមមាន ការទទួលបាន ការបណា្តុះបណា្តាល និងសវោកម្មនានា
ធនធានសម្រាប់ផលិតកម្ម និងទីផ្សារ។** ការកសាងសមត្ថភាព របស់
អង្គការកសិករត្រូវបានចាត់ចំណាត់ថា្នក់ថាជាសមត្ថភាពបច្ចេកទសេ ដែលសំដៅលើ
សមត្ថភាពបំពញ្រកិច្ចការ និងសមត្ថភាពជាយុទ្ធសាស្ត្រ
ដែលទាមទារឱ្យមានជំនាញធ្វើការសម្រេចចិត្ត និងជំនាញគ្រប់គ្រង។ ជាទូទៅ
ដំណើរការកសាងសមត្ថភាពមានមូលដា្ឋានលើសកម្មភាពបំពញ្របន្ថែម ជាច្រើន
ដូចជា ការបណា្តុះបណា្តាល ការអនុវត្ត ការវាយតម្លៃ និងការឆ្លុះបញ្ចាំង។ ប៉ុន្តែ
អត្ថបប្រយោជន៍នានានឹងមិនបានដល់សមាជិកឡើយ
លុះត្រាតែអង្គការកសិកររាចដោះស្រាយបញ្ហាសំខាន់ៗ
(ពាក់ព័ន្ធនឹងការរៀបចំរចនាសម្ព័ន្ធ និងបរិបទ) នៅក្នុងពេលបង្កើត និងដំណើរការ
របស់ពួកគេ។ បញ្ហាបា្រឈមដែលតែងកើតមានផ្សងេទៀត ដែលអង្គការកសិករជួបបា្រទះ
គឺការពុំមានថវិកាគ្រប់គ្រាន់ ដើម្បីអនុវត្តដសកម្មភាព ការទទួលយកសកម្មភាព

(និង/ឬសកម្មភាពដែលមិនមានលក្ខណៈសេដ្ឋកិច្ច) ច្រើនពេក ការអនុវត្តសកម្មភាពមិនមានប្រសិទ្ធភាព និងការទទួលបាន ប្រយោជន៍បានតិចតួច។

អង្គការកសិករនៅកម្ពុជាខ្វះនិរន្តរភាព ដោយសារតែសមត្ថភាពស្ថាប័ននៅមានកម្រិត និង មូលធនសម្រាប់ផ្ដល់កម្ចីមិនមានគ្រប់គ្រាន់

អង្គការកសិករភាគច្រើននៅកម្ពុជា ត្រូវបានបង្កើតឡើង និងគ្រប់គ្រង ដោយទីភ្នាក់ងារ ដែលផ្ដល់ការគាំទ្រដល់ពួកគេ។ មានអង្គការកសិករជិត ៦០% ត្រូវបានបង្កើតឡើងដោយអង្គការ មិនមែនរដ្ឋាភិបាល និងនៅសល់ ៣៨% ទៀត ដឹកនាំដោយអាជ្ញាធរមូលដ្ឋាន និងស្ថាប័នក្នុងវិស័យសាធារណៈ។ បេសកកម្ម និងគោលដៅរបស់អង្គការកសិករ មានទំនាក់ទំនងជាមួយនឹង គោលបំណង របស់ទីភ្នាក់ងារដែលផ្ដល់ការគាំទ្រដល់ពួកគេ ហើយប្រតិបត្តិការរបស់អង្គការកសិករទាំងនេះ ក៏ទទួលបានជំនួយច្រើនពីអង្គការដូចគ្នាទាំងនេះផងដែរ។ នេះបង្ហាញថា ពុំមានអង្គការកសិករណា អាចដំណើរការទៅដោយម្ចាស់ការខ្លួនឯងបានឡើយ។ នៅពេលដែលទីភ្នាក់ងារគាំទ្រសម្រេចដកការគាំទ្ររបស់ពួកគេចេញ អង្គការកសិករចាំបាច់ត្រូវបញ្ចប់សកម្មភាពរបស់ខ្លួនផងដែរ។

ក្រសួងកសិកម្ម រុក្ខាប្រមាញ់ និងនេសាទ បានជម្រុញឱ្យមានការបង្កើតអង្គការកសិករ តាមរយៈកម្មវិធីក្នុងវិស័យសាធារណៈរបស់ខ្លួន។ គោលបំណងចម្បងៗរបស់ក្រសួងកសិកម្ម រុក្ខាប្រមាញ់ និងនេសាទ រួមមាន ១) ផ្ដល់លទ្ធភាពឱ្យកសិករទទួលបានប្រយោជន៍ពីវិស័យកសិកម្ម (ដូចជា ទទួលបានភាគផលពីកំណើនសេដ្ឋកិច្ច ជាដើម) ២) ពង្រឹងទីផ្សារ តាមរយៈការលក់ និង ការទិញជា សមូហភាព ៣) លើកទឹកចិត្តឱ្យកសិករធ្វើការងាររួមគ្នា និងបង្កើតទំនាក់ទំនងអាជីវកម្មជាមួយនឹង វិនិយោគិន និង ៤) បង្កលក្ខណៈឱ្យមានការផ្ទេរបច្ចេកទេស និងសេវាកសិកម្មដល់កសិករ។ ក្រសួងកសិកម្ម រុក្ខាប្រមាញ់ និងនេសាទ ក៏បានរៀបចំនូវសេចក្ដីព្រាងច្បាប់ស្ដីពីអង្គការកសិករ និង សហករណ៍កសិកម្ម ដើម្បីធ្វើបច្ចុប្បន្នកម្មព្រះរាជក្រឹត្យដែលកំពុងមានផងដែរ តាមរយៈការបន្ថែម យុទ្ធសាស្ត្រគាំទ្រផ្សេងទៀត និងផ្ដល់ប្រយោជន៍ឱ្យបានកាន់តែច្រើនជាងមុនដល់កសិករ។

គោលដៅចម្បងរបស់កសិករ

នៅក្នុងការចូលរួមជាមួយនឹងអង្គការនៅមូលដ្ឋាន គឺដើម្បីខ្ចី បង្រាក់ក្នុងអត្រាការបង្រាក់ទាប (២-៣ ភាគរយ ក្នុងមួយខែ) ដោយមានកាលវិភាគសងមកវិញទន់ ភ្លន់។

នេះនឹងកាត់បន្ថយការពឹងអាស្រ័យរបស់ពួកលើអ្នកចងការបង្រាក់ឯកជន និងគ្រឹះស្ថានមីក្រូ ហិរញ្ញវត្ថុផ្លូវការ ដែលគិតអត្រាការបង្រាក់ខ្ពស់។ ការទទួលបានជំនួយបច្ចេកទេស ការបណ្តុះបណ្តាល និងធនធានពីអង្គការដែលផ្តល់ការគាំទ្រ គឺជាមូលហេតុសំខាន់មួយទៀត ដែលធ្វើឱ្យពួកគេចូលរួម នៅក្នុងអង្គការកសិករ។ ជំនួយបច្ចេកទេស រួមមាន ការបណ្តុះបណ្តាលអំពីរបៀបបង្កើនផលិតកម្មដំណាំ (សត្វ និងបន្លែ) និងរបៀបចិញ្ចឹមសត្វ។ ធនធានគាំទ្រមានដូចជា ដំបូន្មានអំពីគ្រាប់ពូជ ការចិញ្ចឹមសត្វ និងបក្សី មិនថាផ្តល់ដោយមិនគិតថ្លៃ ឬឱ្យជំពាក់នោះទេ និងទុនគាំទ្រមួយចំនួន។

ចំណុចដែលនៅខ្វះចន្លោះក្នុងចម្បាប់

នៅក្នុងបរិយាកាសគោលនយោបាយ ដាក់កំហិតមិនឱ្យអង្គការកសិករនានាមានវឌ្ឍនភាពពិតប្រាកដ។

អង្គការកសិករជាច្រើនមិនបានចុះបញ្ជីផ្លូវ ច្បាប់ឡើយ ដោយហេតុថាដំណើរការចុះបញ្ជីនេះមានលក្ខខណ្ឌច្រើនដែលតម្រូវពេញ និងមានលក្ខណៈសម្បត្តិសម្បាញ

ហើយការធ្វើឱ្យអង្គការមានលក្ខណៈផ្លូវការពុំទទួលបានប្រយោជន៍ពិតប្រាកដអ្វីមកវិញឡើយ។ ប៉ុន្តែ ការិយាល័យផ្សព្វផ្សាយកសិកម្ម ដែលជាទីភ្នាក់ងារសំខាន់មួយនៅក្នុងក្រសួងកសិកម្ម រុក្ខាប្រមាញ់ និងនេសាទ មានគំនិតផ្តួចផ្តើមមុនជាច្រើន ក្នុការជួយ និងជម្រុញ លើកទឹកចិត្តដក្រុមកសិករឱ្យក្លាយជានីតិបុគ្គល។

ពួកគេបានផ្តល់ការបណ្តុះបណ្តាលកសាងសមត្ថភាពបច្ចេកទេស និងគ្រប់គ្រងដល់ក្រុមទាំងនេះ។ ការិយាល័យផ្សព្វផ្សាយកសិកម្មក៏បានផ្តល់នូវទុនចាប់ផ្តើមដំបូងខ្លះ ដើម្បីបង្កើនផលិតភាពកសិកម្មរបស់សមាជិកផងដែរ។ ប៉ុន្តែជំនួយជាធនធាន និងការជួយរកទីផ្សារ ដល់សហករណ៍កសិកម្មដែលបានចុះបញ្ជីរួចនៅមានតិចតួចខ្លាំងនៅឡើយ។ សហករណ៍កសិកម្មមួយចំនួនមានការពន្យល់បារម្ភអំពីនិរន្តរភាពរបស់អង្គការកសិករ បន្ទាប់បើអង្គការកសិករទាំងនេះនៅបន្តផ្តល់ជូនតែលើការសន្សំ និងការផ្តល់កម្ចីដោយមិនខិតខំធ្វើការកែលំអសកម្មភាពអាជីវកម្មរបស់ ខ្លួន។

អង្គការកសិករជួបប្រទះនឹងបញ្ហាប្រឈមផ្នែកស្ថាប័នជាច្រើន ដែលបន្ទុចបង្អាក់ដល់ការធ្វើ សកម្មភាពរបស់ពួកគេ និងមិនឱ្យពួកគេអោចបំពេញទៅតាមសេចក្ដីត្រូវការរបស់សមាជិកបាន។ បញ្ហាប្រឈមសំខាន់ៗ មានដូចខាងក្រោម៖

ក) ***កង្វះដើមទុនសម្រាប់ផ្ដល់កម្ចី*** - មានអង្គការកសិករ ៨៣% បញ្ជាក់ថា ពួកគេពុំមានប្រាក់ គ្រប់គ្រាន់ ដើម្បីផ្ដល់កម្ចីដល់សមាជិករបស់ខ្លួនឡើយ។ ដូច្នេះ ជារឿយៗ សមាជិកអង្គការ កសិករជាច្រើនតែទៅទិញធនធានកសិកម្ម (ដូចជា ឧបករណ៍ ជី គ្រាប់ពូជ សត្វ ជាដើម) ដោយជំពាក់ ពីទីភ្នាក់ងារដែលផ្ដល់ការគាំទ្រដល់ពួកគេ ឬពីឈ្មួញ និងសងពួកគេវិញ ក្រោយ ពេលប្រមូលផលរួច។ សមាជិកជាច្រើនក៏ទៅខ្ចីបុលពីគ្រឹះស្ថានមីក្រូហិរញ្ញវត្ថុផងដែរ បើទោះបីជាអត្រាការប្រាក់មានកម្រិតខ្ពស់យ៉ាងណាក៏ដោយ ដើម្បីវិនិយោគលើការបង្កបង្កើនផលស្រូវ បន្លែ និងការចិញ្ចឹមសត្វរបស់ពួកគេ។ នេះបង្ហាញថា សមាជិកដែលមានជីវភាពក្រីក្រមិនអាចមានលទ្ធភាពទទួលបានធនធានសំខាន់ៗមួយចំនួនឡើយ ហើយបើទោះបីជាពួកគេបានរៀនចេះបច្ចេកទេសកសិកម្មថ្មីៗ ពីអង្គការកសិកររបស់ពួកគេក៏ដោយ ក៏ពួកគេពុំមានមធ្យោបាយ ដើម្បីយកចំណេះដឹងទាំងនេះមកអនុវត្តជាក់ស្ដែង សម្រាប់ បង្កើនផលិតភាពដំណាំរបស់ពួកគេដែរ។

ខ) ***ភាពមិនចេះអក្សរ និងការមានចំណេះដឹងតិចតួចរបស់សមាជិកអង្គការកសិករ*** - សមត្ថភាព ទាបរបស់ធនធានមនុស្ស ដូចជា ការដឹកនាំនៅមានកម្រិត ជំនាញរក្សាទុកបញ្ជី ស្នាម គ្រប់គ្រងហិរញ្ញវត្ថុ និងប្រាស្រ័យទាក់ទងនៅមានកម្រិតខ្សោយ គឺជាឧបសគ្គចម្បង ក្នុងការស្វែងរកសមាជិកអង្គការកសិករដែលមានលក្ខណៈសមស្រប ឱ្យធ្វើជាអ្នកដឹកនាំ និង/ឬអ្នកគ្រប់គ្រង។ ដោយសារតែចំណេះដឹងរបស់សមាជិកនៅមានកម្រិត ពួកគេមាន ការពិបាកក្នុងការស្វែងយល់ពីមុខងាររបស់ក្រុម និងក្របខ័ណ្ឌច្បាប់ សម្រាប់ដំណើរការរបស់អង្គការកសិករ[2]។ នេះគឺជាបញ្ហាសំខាន់មួយ

ដែលងាយនាំឱ្យពុំមានការជឿទុកចិត្ត ជាពិសេស លើបញ្ញើសន្សំហិរញ្ញវត្ថុតែម្ដង។

គ) *ការចូលរួមរបស់សមាជិកអង្គការកសិករនៅមានកម្រិត ហើយការពង្រឹងការអនុវត្ត បទបញ្ជាផ្ទៃក្នុងនៅមានកម្រិតទាប* - មានមូលហេតុចំនួន ៣ ដែលនាំឱ្យមានបញ្ហានេះ។ ទីមួយ សមាជិកដែលជំពាក់បំណុលអង្គការកសិករច្រើនពេក ច្រើនតែគេចវេសមិនចូលរួមនៅក្នុងសកម្មភាពរបស់អង្គការកសិករ។ ទីពីរ សមាជិកមួយចំនួនជាប់រវល់ធ្វើការងារឆ្ងាយពីភូមិ ដែលនាំឱ្យពួកគេពុំមានពេលវេលាគ្រប់គ្រាន់ ដើម្បីចូលរួម។ ទីបី អ្នកដឹកនាំរបស់អង្គការកសិករចាំបាច់ត្រូវខិតខំឱ្យមានតុល្យភាពរវាងការពង្រឹងការអនុវត្តបទបញ្ជា និង ការយោគយល់ នៅពេលដែលសមាជិកមួយចំនួនមិនអនុវត្តតាមលក្ខន្តិកៈ និងបទបញ្ជារបស់អង្គការកសិករ។

ឃ) *ការមិនជឿទុកចិត្តគ្នា* - ការមិនជឿទុកចិត្តលើអង្គការកសិករ ភាគច្រើនកើតចេញពីការរក្សាទុកបញ្ញើសន្សំហិរញ្ញវត្ថុមិនបានត្រឹមត្រូវ ហើយសមត្ថភាពរបស់អ្នកដឹកនាំក្រុមនៅមាន កម្រិត។ សមាជិកក្រុមភាគច្រើនពឹងអាស្រ័យខ្លាំងលើអង្គការដែលផ្ដល់ការគាំទ្ររបស់ពួកគេ ក្នុងការពិនិត្យលើគ្រប់ឯកសារហិរញ្ញវត្ថុទាំងអស់។ ពួកគេរំពឹងថា អ្នកសម្របសម្រួលមកពីអង្គការមិនមែនរដ្ឋាភិបាលទាំងនេះ នឹងជួយដល់ក្រុមរបស់ពួកគេ នៅពេលដែលពួកគេជួបប្រទះបញ្ហា និងជាពិសេស ជួយពិនិត្យលើឯកសារហិរញ្ញវត្ថុរបស់ក្រុមពួកគេ នៅរៀងរាល់ខែ។

លទ្ធផលរកឃើញសំខាន់ៗខាងផ្នែកបរិមាណ

- **កសិករ ដែលមានដើមទុនខ្ពស់សម្រាប់ផលិតកម្មរបស់ខ្លួន មិនសូវជាចូលរួមនៅក្នុងអង្គការ កសិករឡើយ។** នៅពេលដែលតម្លៃរបស់ទ្រព្យសម្បត្តិច្រើនជាង ១៣ លានរៀល (៣២៧១ ដុល្លារ) កសិករកាន់តែមិនសូវចាប់អារម្មណ៍ចង់ចូលរួមនៅក្នុងសកម្មភាពនានារបស់ អង្គការកសិករ។ ប៉ុន្តែ គ្រួសារដែលមានទ្រព្យកសិកម្មមានតម្លៃទាបជាង ១៣ លានរៀល ចង់ចូលរួមនៅក្នុងអង្គការកសិករ។

- **លទ្ធភាពចូលធ្វើជាសមាជិករបស់អង្គការកសិករមានការកើនឡើង ប្រសិនបើគ្រួសារអាច ទទួលបានឥណទាន។** ប៉ុន្តែ មិនទាន់មានភាពច្បាស់លាស់នៅឡើយទេ ថាតើមាន ការទទួលបានឥណទានរបស់គ្រួសារ មានទំនាក់ទំនងហេតុផលជាមួយនឹងបំណងចង់ចូលរួម នៅក្នុងអង្គការកសិករ។
- **គ្រួសារដែលមានស្ត្រីជាមេគ្រួសារ ច្រើនតែចង់ចូលរួមនៅក្នុងអង្គការកសិករ។** គេអាច ពន្យល់បានថា ជាធម្មតា បុរសនៅកម្ពុជាមិនសូវចាប់អារម្មណ៍ចង់ចូលរួមធ្វើការងារសម័គ្រចិត្តឡើយ ដូច្នេះពួកគេមិនចូលរួម នៅក្នុងអង្គការកសិករឡើយ។
- **ប្រសិនបើគ្រួសារមួយមានសមាជិកលើសពី ៦ នាក់ គ្រួសារនេះទំនងជាចូលរួមជាមួយនឹង អង្គការកសិករនៅមូលដ្ឋាន។** នេះមានន័យថា គ្រួសារដែលចូលជាសមាជិករបស់អង្គការ កសិករ ចាំបាច់ត្រូវតែទុកកម្លាំងពលកម្មរបស់ខ្លួន ដើម្បីធ្វើការងាររួមរបស់គ្រួសារ។
- **អាយុរបស់មេគ្រួសារមានទំនាក់ទំនងជាវិជ្ជមាន ជាមួយនឹងលទ្ធភាពចូលរួម នៅក្នុងអង្គការ កសិករ។** ប្រសិនបើមេគ្រួសារអាយុតិចជាង ៥៤ ឆ្នាំ គ្រួសារនេះចូលរួមនៅក្នុងសកម្មភាព របស់អង្គការកសិករ។ គ្រួសារដែលមានមេគ្រួសារអាយុច្រើនជាងនេះ មិនទំនងជាចូលរួម ជាមួយនឹងអង្គការកសិករណាមួយឡើយ។
- **មេគ្រួសារដែលពុំមានការងារធ្វើ ទំនងជាសមាជិករបស់អង្គការកសិករ។** មូលហេតុគឺអាច ដោយសារតែគ្រួសារទាំងនេះ មានបុរសជាមេគ្រួសារ (៧0%) ដែលមានអាយុតិចជាង ៥៤ ឆ្នាំ។

លទ្ធផលរកឃើញសំខាន់ៗខាងផ្នែកគុណភាព

- **សមាជិករបស់សហករណ៍កសិកម្ម ទទួលបានចំណូល និងប្រាក់ចំណេញខ្ពស់ពីការបង្កបង្កើនផលស្រូវ និងការចិញ្ចឹមសត្វ បើធៀបជាមួយនឹងអ្នកដែលមិនចូលជាសមាជិក ឬសមាជិករបស់ក្រុមកសិករ។** ការប្រៀបធៀបអង្គការកសិករទាំង ៣ ប្រភេទ បង្ហាញថាចំណូល និងប្រាក់ចំណេញ ដែលសមាជិករបស់សហករណ៍កសិកម្ម ទទួលបានពីការបង្កបង្កើនផលស្រូវ និងពីការចិញ្ចឹមសត្វ គឺមានកម្រិតខ្ពស់ជាងចំណូល និងប្រាក់ចំណេញរបស់គ្រួសារដែលជា សមាជិករបស់ក្រុមកសិករ។ សកម្មភាពជាសមូហភាព ជាពិសេស ការទិញជី និងការលក់ជី ដែលធ្វើឡើងដោយសមាជិករបស់អង្គការកសិករ នៅមានកម្រិតនៅឡើយ

ដោយសារតែសមាជិកអង្គការកសិករភាគច្រើនទទួលបានធនធាន (៧៦%) និងលក់ទិន្នផល (៨១%) រៀងៗខ្លួន ពោលគឺពួកគេត្រូវបង់ និងទទួលបានតម្លៃប្រហាក់ប្រហែលគ្នានឹងអ្នកដែលមិនមែនជាសមាជិកដែរ។

បើធៀបជាមួយនឹងអង្គការផ្សេងទៀត សហករណ៍កសិកម្មមានទំហំ ធំជាង បានចុះបញ្ជីផ្លូវការ និងធម្មតា មានសមាជិកជាង ៣០ នាក់។

- **ការចូលរួមនៅក្នុងសហករណ៍កសិកម្ម មានទំនាក់ទំនងជាវិជ្ជមានជាមួយនឹងសន្ដិសុខសប្បៃរបស់ប្រជាពលរដ្ឋបននៅតាមតំបន់ជនបទ តាមរយៈការបង្កើនផលិតភាពផលិតកម្មសត្វ និង ការចិញ្ចឹមសត្វ។** ប៉ុន្ដែ គមិនអាចប្រាងើយកន្ដើយចំពោះអង្គការកសិករប្រភេទផ្សេងទៀតឡើយ ដោយសារតែក្រុមកសិករដែលបំពេញមុខងារបានលះអនឹងរឹតចម្រើនក្លាយជា សហករណ៍កសិកម្ម។
- **ការចូលរួមនៅក្នុងអង្គការកសិករ ពុំមានឥទ្ធិពលគួរឱ្យកត់សម្គាល់មកលើចំណូល ដែលគួរសារទទួលបានពីការបង្កបង្កើនផលសត្វ និងការចិញ្ចឹមសត្វ។**
- **ការចូលរួមនៅក្នុងសមាគមកសិករ មានឥទ្ធិពលជាវិជ្ជមានយ៉ាងធំធេងមកលើចំណូល និង បន្ទាក់ចំណញ ដែលសមាជិកសមាគមកសិករទទួលបានពីការចិញ្ចឹមសត្វ ប៉ុន្ដែមិនមែនពីការ បង្កបង្កើនផលសត្វឡើយ។**
- **អង្គការកសិករនៅកម្ពុជាមិនទាន់បានបង្កើនលទ្ធភាពទទួលបានទីផ្សាររបស់សមាជិកនៅ ឡើយទេ ដោយសារតែពួកគទិញធនធាន និងលក់កសិផលរបស់ខ្លួនរៀងៗខ្លួន។** នះមាន នយថា តម្លៃដែលគ្រូបានទូទាត់ និងទទួលបានដោយសមាជិកអង្គការកសិករ គឺប្រហាក់ប្រហែលគ្នា ជាមួយនឹងអ្នកដែលមិនមែនជាសមាជិកដែរ។

សចេក្ដីសន្និដ្ឋានសំខាន់ៗ

ជារួម ពុំមានភស្ដុតាងតាមការសង្ការជ្រាវដើម្បីបញ្ជាក់ថាអង្គការកសិករ គឺជាមធ្យោបាយល្អដើម្បីសម្រេចបាននូវសន្ដិសុខសប្បៃនោះទេ។

មូលហតុអាចមានដូចជា ៖

- ការទិញធនធាន និងការលក់កសិផលលើទីផ្សាររួមគ្នា មិនទាន់ជាការអនុវត្ដរបស់អង្គការ កសិករនៅក្នុងប្រទសេកម្ពុជានៅឡើយ។

- អង្គការកសិករជួបបញ្ហាច្រើនដែលមិនអាចធ្វើឱ្យអង្គការ ទាំងនេះក្លាយជាអង្គការដែលមាននិរន្ដរភាព និងមានមធ្យោបាយការដោយខ្លួនឯង សម្រាប់ សមាជិករបស់ខ្លួន។

វិស័យអង្គការកសិករនៅកម្ពុជា ទើបតែសែ្ថិតនៅដំណាក់កាលអភិវឌ្ឍន៍ដំបូងនៅឡើយ។

- អង្គការកសិករមិនទំនងជាដំណើរការទៅបានប្រកបដោយប្រសិទ្ធភាពឡើយ ប្រសិនបើពុំ មានការចូលរួមពីវិស័យឯកជន/ក្រុមហ៊ុនឯកជន។ ជំនួយហិរញ្ញវត្ថុ និងជំនួយបច្ចេកទេស មានប្រភពពីអង្គការមិនមែនរដ្ឋាភិបាល និងក្រុមហ៊ុនក្នុងវិស័យសាធារណៈរបស់ប្រទេស កម្ពុជា។
- គួរមានការផ្ដល់ការកសាងសមត្ថភាព ដើម្បីពង្រឹងជំនាញដឹកនាំ និងគ្រប់គ្រងរបស់អង្គការ កសិករ ការរៀបចំផែនការយុទ្ធសាស្ដ្រ និងផែនការអាជីវកម្ម ការគ្រប់គ្រងធនធាន ហិរញ្ញវត្ថុ និងធនធានមនុស្ស និងគួរមានការផ្ដល់ការគាំទ្រពីខាងក្រៅ (បច្ចេកទេស ផលិតកម្ម និងជំនាញ/សមត្ថភាពគ្រប់គ្រង) ដល់អង្គការកសិករប្រភេទជាក់លាក់ នៅក្នុងរយៈពេលមួយ
ដើម្បីផ្ដល់លទ្ធភាពឱ្យអង្គការកសិកររៀនសូត្រប្រកបដោយ ប្រសិទ្ធភាពសិន មុននឹងឱ្យពួកគេដើណើរការដោយមធ្យោបាយខ្លួនឯង។
- ដើម្បីបង្កើនឥទ្ធិពលពីការចូលរួម នៅក្នុងអង្គការកសិករ ក្នុងគោលបំណងជម្រុញលើក
កម្ពស់ជីវភាពរស់នៅរបស់ប្រជាពលរដ្ឋនៅតំបន់ជនបទ ការកសាងសមត្ថភាព និងយន្ដការ នានាអាចជួយឱ្យអង្គការកសិករទទួលបានការផ្គត់ផ្គង់ធនធាន ហើយគួរលើកកម្ពស់ ទីផ្សារសម្រាប់កសិផលបន្ថែមទៀត។
- ការបញ្ចូលយុទ្ធសាស្ដ្រអភិវឌ្ឍន៍អង្គការកសិករ
និងការធ្វើកសិកម្មតាមកិច្ចសន្យា អាចជួយ ធានានិរន្ដរភាពដំណើរការរបស់អង្គការកសិករ
និងបង្កើនឥទ្ធិពលមកលើសន្ដិសុខស្បៀង និងការកាត់បន្ថយភាពក្រីក្រ។

ការបង្កើនផលិតភាពកសិកម្ម អាចសម្រេចទៅបាន តាមរយៈការប្រើប្រាស់បច្ចេកទេស និង សវោកម្មទំនើប។

- គួរមានការបន្ដផ្ដល់សេវាបច្ចេកទេសដល់អង្គការកសិករ ប៉ុន្ដែគួរមានលក្ខណៈសាមញ្ញ ជាក់លាក់ ច្បាស់លាស់ និងឆ្លើយតបចំពោះតម្រូវការរបស់អង្គការកសិករ។
- បម្រាមពលរដ្ឋបន្ដទៅជនបទតម្រូវការឥណទាន ដើម្បីកំណែអការដាំដុះ និងចិញ្ចឹមសត្វ និងជីវភាពរស់នៅរបស់ខ្លួន។ គោលនយោបាយ និងយុទ្ធសាស្ដ្រ របស់រដ្ឋាភិបាល ដើម្បីជម្រុញលើកកម្ពស់ឥណទានជនបទ គួរកំណែអបន្ថែមទៀត។

ភាពពាក់ព័ន្ធខាងផ្នែកគោលនយោបាយ

១. នៅក្នុងការពង្រឹងឱ្យអង្គការកសិករនៅកម្ពុជា កំលាយជាមធ្យោបាយបម្រុងបដោយបម្រុងសិទ្ធភាព មួយ ដើម្បីជម្រុញលើកកម្ពស់ជីវភាពរស់នៅតាមតំបន់ជនបទ មានការពន្លឿយបារម្ភមួយ ចំនួន ចញ្ចើការសិក្សានេះ ដែលចាំបាច់តម្រូវធ្វើការដោះស្រាយ។ ការកសាងសមត្ថភាព ដើម្បីពង្រឹងជំនាញដឹកនាំ និងគ្រប់គ្រង ការរៀបចំផែនការយុទ្ធសាស្ដ្រ និងផែនការ អាជីវកម្ម ការគ្រប់គ្រងហិរញ្ញវត្ថុ និងការគ្រប់គ្រងធនធានមនុស្ស គឺជាអ្វីដែលចាំបាច់តម្រូវ ធ្វើជាបន្ទាន់ ដើម្បីជួយដោះស្រាយបញ្ហាបម្រុងឈមក្នុងដំណើរការ ដែលអង្គការកសិករជួប បម្រុងនេះ។

២. កម្រិតពីការកំណែអការអនុវត្ដបច្ចេកទេសកសិកម្ម ដែលចាំបាច់តម្រូវតម្លៃ និងឆ្លើយតប ចំពោះតម្រូវការរបស់អង្គការកសិករ ដើម្បីឱ្យមានផលិតភាពកាន់តខ្ពស់ជាងមុន គួរមាន ការកំណែអគោលនយោបាយ និងយុទ្ធសាស្ដ្របន្ថែមទៀត ដើម្បីជម្រុញលើកកម្ពស់ឱ្យមាន ការផ្ដល់ឥណទានជនបទ សម្រាប់គាំទ្រឱ្យសមាជិកអង្គការកសិករកាន់តអោចបង្កើនការ វិនិយោគរបស់ពួកគលើការងារកសិកម្ម និងលើសកម្មភាពអាជីវកម្មផ្សេងទៀត ជាជាង បម្រើបម្រាស់បម្រាក់សន្សំដលែពួកគមានតិចតួច និងបម្រើសវោកម្មថ្មី ដលែសង្កតេឃើញមាន ជាទូទៅ នៅក្នុងតំបន់សិក្សាទាំងនេះ។

៣. ដើម្បីធានានិរន្ដរភាពដំណើរការរបស់អង្គការកសិករគ្រប់បម្រុងទេនៅកម្ពុជា គួរមានការផ្ដល់ ការគាំទ្រជាក់លាក់ពីខាងកម្រិត (ដូចជា បច្ចេកទេសផលិត និងជំនាញ/សមត្ថភាពគ្រប់គ្រង ជាដើម) ដល់អង្គការកសិករ

នៅក្នុងរយៈពេលមួយ ដើម្បីផ្ដល់លទ្ធភាពឱ្យអង្គការកសិករ អាចរៀនសូត្របន្ថែមដោយប្រសិទ្ធភាព និងភាពសំខាន់ស្ថិតិ មុននឹងឱ្យពួកគេដំណើរការ ដោយខ្លួនឯង។

៤. ដើម្បីលើកកម្ពស់ និងកកែលំអជីវភាពរស់នៅរបស់ប្រជាពលរដ្ឋនៅតំបន់ជនបទ តាមរយៈ ការចូលរួមនៅក្នុងអង្គការកសិករ កសាងសមត្ថភាព និងយន្តការ ដែលអាចជួយឱ្យអង្គការ កសិករទទួលបានការផ្គត់ផ្គង់ធនធាន និងទីផ្សារសម្រាប់កសិផលរបស់ខ្លួន គួរត្រូវបាន ជម្រុញបន្ថែមទៀត និងទទួលបានការគាំទ្រពីអ្នកពាក់ព័ន្ធនានា។ គម្រោងកសិកម្មកិច្ចសន្យា គឺជាយន្តការដ៏ល្អមួយ សម្រាប់ភ្ជាប់ទំនាក់ទំនងរវាងអង្គការកសិករ ជាមួយនឹង ធនធាន ដែលមានតម្លៃទាប និងទីផ្សារដែលផ្ដល់តម្លៃបានល្អជាប់លាប់។ ប៉ុន្តែ ក្របខ័ណ្ឌច្បាប់ស្ដីពីការធ្វើកសិកម្មកិច្ចសន្យា គួរត្រូវបានដាក់ឱ្យអនុវត្ត និងពង្រឹងបន្ថែមទៀត ដើម្បី ការពារសមាជិករបស់អង្គការកសិករពីការកេងប្រវ័ញ្ចនានា ឬបង្ការភាគីមិនឱ្យគេចវេសពីការអនុវត្តតាមកិច្ចសន្យា។

៥. ភស្តុតាង ដែលទទួលបានពីការស្រាវជ្រាវរបស់យើងបង្ហាញថា សមាជិករបស់សហករណ៍ កសិកម្ម មានជីវភាពធូរធាជាង បើធៀបជាមួយនឹងសមាជិករបស់ក្រុមកសិករ និងសមាគម កសិករ និងអ្នកដែលមិនមែនជាសមាជិក និងមានទំនាក់ទំនងជាវិជ្ជមានជាមួយនឹងការ បង្កើនសន្តិសុខស្បៀង។ ដូច្នេះ គោលនយោបាយ ដែលគាំទ្រ និងលើកកម្ពស់អង្គការកសិករ អាចត្រូវបានជម្រុញលើកកម្ពស់បន្ថែមទៀតពីសំណាក់អ្នកពាក់ព័ន្ធនានា មិនត្រឹមតែសហករណ៍កសិកម្មប៉ុណ្ណោះទេ ប៉ុន្តែថែមទាំងប្រភេទអង្គការកសិករដទៃទៀត ដោយសារតែក្រុមកសិករដែលដំណើរការបានល្អ នឹងអភិវឌ្ឍក្លាយជាសហករណ៍កសិកម្ម។

៦. ចុងក្រោយ
ដើម្បីផ្ដល់ការលើកទឹកចិត្តឱ្យអង្គការកសិករចុះបញ្ជីស្របច្បាប់ ជាមួយនឹង អាជ្ញាធរពាក់ព័ន្ធ ដូចជា ក្រសួងមហាផ្ទៃ ក្រសួងកសិកម្ម រុក្ខាប្រមាញ់ និងនេសាទ ឬក្រសួងពាណិជ្ជកម្ម ដំណើរការចុះបញ្ជីនេះគួរសម្រួលឱ្យកាន់តែងាយស្រួលជាងមុន ដោយគ្រាន់

តកោត់បន្ថយលក្ខខណ្ឌឧតមួវខាងឯកសារ ការពន្លឿនតិរិធីចុះបញ្ជីនិងការកាត់បន្ថយការិយាធិបតេយ្យ។

Executive Summary

This report assesses the impact of participation in farmer organisations (FOs) on food security of rural households in Cambodia. The study is particularly set out to following: 1) Examine FOs' roles and operation and challenges for improving household's food security; 2) Analyze household's characteristics that determine participation in FOs; 3) Assess the impact of FOs on food security and livelihood of the rural poor; and 4) Provide specific recommendations for changes in relevant legal acts and regulatory frameworks associated with FOs.

The study concentrates on three types of FOs based on their predominance in Cambodia. Farmer groups (FG) are informal gatherings with 10-30 members. Farmer associations (FA) have more than 30 members and can either be informal or formal if registered at the Ministry of Interior. Agricultural cooperatives (AC) are business-oriented, registered at the Provincial Department of Agriculture (PDA) and comprise generally more than 30 members.

Qualitative information was gathered from focus group discussions to examine the roles and operation of FOs and their challenges. Discussions with FO members and key informant interviews with stakeholders took place in four provinces (Kampot, Kampong Thom, Battambang and Svay Rieng) with a high density of operating FOs.

For quantitative data a propensity score matching (PSM)[3] technique was used to assess the impact of FO participation on food security. The cross-section survey data of approximate 330 FO member households were randomly selected from three FO sub-sectors (i.e. FG, FA and AC, at proportions of 50:30:20 percent) and 369 households were selected from the same villages of the selected communes using systematic random sampling to form the control group.

The government of Cambodia promotes increasing rice exports through the development of farmer organizations

In Cambodia, over 90 percent of the poor live in rural areas and rely on agriculture for their primary sources of livelihood. Poor infrastructure (particularly irrigation and rural infrastructure), insecure land ownership and inadequate access to technology and agricultural extension services are the major challenges that the smallholder farmers currently face. In addition, poor access to credit, unreliable market information, and low public investments in the agricultural sector are factors limiting a genuine development of the agribusiness sector in general. Without

[3] Propensity Score Matching is an approach used to match observations or households between group participating in FOs and those who do not based on observable common characteristics.

cooperation and collective action, individual Cambodian farmers are unable to effectively address these shortcomings.

The Cambodian government has articulated the role of FO as a key to increased agricultural productivity and better food security through tighter cooperation with the private sector. In 2001, the Royal Decree on Agricultural Cooperatives was issued and FOs and agricultural cooperations were legally recognized. Since then several non-governmental (NGO) and development organizations have established FOs in the rural areas to implement their development programs. While NGOs and the public sector are actively supporting FO operations, there is a visible lack of private sector involvement.

The FO's main mission is to promote and manage savings, and provide credit for its members for investing in their agricultural production. The FOs have also introduced new agricultural techniques and provided some in-kind input support for crops and livestock. Collective action to support general access to inputs (equipment, fertilizer, seed, livestock) and markets has been non-existent given that the majority of FO members purchase inputs and sell produce on an individual basis.

In addition to favourable credit opportunities, the potential benefits of FO memberships include access to training and services, production inputs and market. Capacity building of FOs is classified into technical capacity that refers to the ability to handle tasks, and strategic capacity which entails decision-making and managerial skills. A capacity building process is generally based on several complementary activities like training, implementation, evaluation and reflection. However, benefits will not accrue to the members unless FOs can deal with the key challenges (organisational and contextual) during their establishment and operation. Other common problems faced by FOs are not having enough money to carry out activities, taking on too many activities (and/or non-economic activities), running activities ineffectively, and reaping limited benefits.

Cambodia's farmer organizations lack sustainability due to limited institutional capacity and a lack of lending capital

Most of the FOs in Cambodia are established and controlled by support agencies. Nearly 62% of FOs are established by NGOs and the rest 38 % are lead by local authorities and public sector organizations. FO's mission and goals correlate largely the objectives of their support agencies, and their operations are significantly assisted by the same organisations. This indicates that none of the FOs could operate independently. Whenever the support agency decides to withdraw their support, FO needs to quit its activities.

Ministry of Agriculture Forestry and Fisheries (MAFF) has promoted the FOs through its public sector programs. The primary objectives of MAFF are: 1) Enable

farmers to get advantages from the agriculture sector (i.e. sharing economic growth); 2) Strengthen marketing through collective selling and buying; 3) Encourage farmers to work collectively and forge business links with investors; and 4) Facilitate the transfer of agricultural techniques and services to farmers. MAFF has also drafted a law for the FOs and ACs to update the existing Royal Sub-decree, by adding other support strategies to protect and give more advantages to the farmers.

Farmers' primary goal of participating any local organization is to borrow money at lower interest rates (2-3 percent per month) and with a flexible repayment schedule. This would reduce their dependency on private moneylenders and official microfinance institutions (MFI), who charge high interest rates. Getting technical assistance, training and inputs from support agencies is another important reason for participating in FOs. Technical assistance includes trainings on how to improve crop production (rice and vegetables) and raise livestock. Inputs' support includes an advice on seeds, livestock and poultry farming, whether free or on credit, and some capital support.

Legal shortcomings in the policy environment restrict genuine progress of FOs. Many FOs are not legally registered because the process is excessive and complicated, and formalization doesn't involve real benefits. However, the Office of Agricultural Extension (OAE), a key agency within MAFF, has been proactive in helping and promoting farmer groups to become legal entities. They have offered technical and managerial capacity building trainings for these groups. OAE has also provided some start-up capital to improve members' agricultural productivity. However, assistance on inputs and market access for already registered ACs has remained scarce. Some ACs are concerned about the sustainability of farmer organizations if they continue focusing only on savings and lendings without improving other business activities.

The FOs face several institutional challenges that restrain their performance and hinder their ability to meet members' needs. The main challenges are following:

a) ***Lack of credit capital.*** About 83% of FOs confirm they do not have enough money to provide loans to their members. Thus, many FO members often get their agricultural inputs (equipment, fertilizer, seed, livestock) on loan from support agencies or traders and pay for them after harvest. Many members also access MFIs, despite the high interest rate, to invest in their rice, vegetables or livestock production. This indicates that the poorer members are unable to access some important inputs, and despite having learned new agricultural techniques from their FOs, do not have the means to put them into practice to improve crop productivity.

b) ***Illiteracy and limited knowledge of FO members.*** The low capacity of human resources, including limited leadership, poor book-keeping, financial management and communication skills are the main constraints for finding suitable FO member candidates as leaders and/or managers. Given members' limited knowledge, they find it difficult to understand the group's function and

the legal framework for FO[4] operations. This is a critical issue that can easily lead to mistrust, especially over financial records.

c) ***Limited participation from FO members and poor enforcement of internal regulations.*** There are three reasons for this. First, members who are deeply in debt to the FO tend to avoid taking part in any FO activities. Second, some members are so busy working far away from the village that they do not have enough time to participate. Third, the FO leaders need to strike a balance between rule enforcement and tolerance when some members do not conform to the FO's statute and rules.

d) ***Mistrust.*** Mistrust in FOs mostly stems from improper financial record keeping and the limited capacity of group leaders. Most group members highly depend on the support agencies to monitor all financial records. They expect the facilitators assigned by the NGOs to assist the groups whenever they face problems, and to especially monitor their groups' financial records every month.

Key quantitative findings

- **Farmers with higher levels of productive capital are less likely to participate in FOs.** When the asset value becomes larger than 13 million Riels (*ca* 3271 USD), farmers become less interested in participating in FOs activities. However, households with fewer than 13 million Riels of agricultural assets prefer participating in FOs.

- **The likelihood of being a FO member increases if the household gets access to credit.** However, it is not clear whether or not there is a casual relationship between household access to credit and the propensity to participate in a FO.

- **Female-headed households are more likely to participate in FOs.** It can be explained that Cambodian men usually exhibit less interest in voluntary work and therefore don't participate in local FOs.

- **If household's size is larger than 6 members, it is more likely that they engage with local FOs.** This suggests that FO's member-households need to set aside their labour to engage in collective work.

- **Age of a household's head has a positive relation with the probability of participating in FOs.** If the head of household is less than 54 years old, the family participates in the FO's activities. Households with older leaders are unlikely to join any farmer organization.

[4] Legal framework is too complex for farmers with limited knowledge to clearly understand the legal context of formal organisations

- **Unemployed household head is likely to be a member of FOs.** Possible explanation is that these households are lead by male (70%) who are less than 54 years old.

Key qualitative findings

- **Members of agricultural cooperatives (AC) get higher revenues and profits from rice and livestock production than non-members or members of farmer groups (FG).** A comparison of the three types of farmer organizations shows AC members' revenue and profit from rice and livestock production are significantly higher than that of FG members' households. The collective action, especially bulk purchases and bulk sales by FO members remain limited because the majority of FO members access inputs (76%) and sell outputs (81%) on an individual basis, thereby paying and attaining similar prices to non-members. Compared to other organizations ACs are bigger, officially registered and usually with more than 30 members.

- **Participation in AC is positively associated with rural household's food security through improved rice and livestock productivity.** However, other type of FOs cannot be ignored because well-functioning FGs are growing into AC.

- **Participation in farmer organization (FO) in has no significant effect on household's revenue from rice and livestock production.**

- **Participation in farmer associations (AC) have positive and significant impact on FA members' revenue and profit from livestock, but not from rice production**.

- **FOs in Cambodia don't enhance yet members' access to markets because farm inputs are purchased and agricultural produce are sold largely on an individual basis.** This means prices paid and attained by FO members are similar to those of non-members.

Key conclusions

Overall, there is no empirical evidence to prove that FO is good tool for achieving food security.

Possible reasons are:

- Collective action in accessing to inputs and market products is not yet a common practice of FOs in Cambodia;
- FOs are facing significant institutional challenges restricting them becoming self-sustainable and reliable organization for their members

FO sector in Cambodia is still in early stage of development.

- FOs are unlikely to operate sustainably given a lack of engagement of private sector/companies. Financial and technical aid comes from NGOs of Cambodia's' public sector companies;
- Capacity building to strengthen FOs' leadership and management skills, strategic and business planning, financial and human resource management should be provided; and, the external support (production techniques and managerial skills/capacity) should be provided to specific type of FOs over a period of time in order to allow FOs to effectively and efficiently learn before letting them operate independently;
- To increase the impact of participation in FOs in order to promote rural livelihoods, a capacity building and mechanisms that could help FOs gain access to inputs supply and markets for produce should be enhanced; and
- Combination of FO development strategy and contract farming scheme could help to sustain FO operation and increase its impact on food security and poverty alleviation.

Improved agricultural productivity can be achieved through the use of modern agricultural techniques and services.

- Technical services should be continued to provide to FOs, but should be simple, specific, clear and respond to FO needs;
- Rural households need credit for upgrading farm production and livelihood. Policies and strategies of the government to promote rural credit should be further improved.

Policy implications

1. In strengthening FOs in Cambodia as an effective instrument for advancing rural livelihoods, some concerns arising from this study will need to be addressed. Capacity building to strengthen leadership and management skills, strategic and business planning, financial management, and human resource management are immediately needed to help resolve the operational challenges facing FOs.

2. Apart from improved agricultural technical practices, which need to be available and respond to FOs' needs in order to improve productivity, policies and strategies to promote rural credit should be further improved to support FO members better in increasing investment in agricultural production and other business activities rather than drawing on their limited savings and on available lending generally observed in the study areas.

3. To also sustain the operations of all types of FOs in Cambodia, external support (production techniques and managerial skills/capacity) should be specifically provided to FOs over a period of time in order to allow FOs to effectively and efficiently learn before letting them operate independently.

4. To promote and advance rural livelihoods through participation of FOs, capacity building and mechanisms that could help FOs gain access to inputs supply and markets for produce should further be enhanced and supported by stakeholders. The contract-farming scheme would be a good mechanism for connecting FOs to lower input costs and secure market prices. However, legal framework on contract farming should be put in place and enforced to protect FO members from exploitation or prevent any party from reneging on contract agreements.

5. Our empirical evidence shows AC member are better off compared to FG and FA members and non-members, and hence positively associated with food security improvement. Therefore, policy that supports and promotes FOs could be enhanced by stakeholders not only ACs but also other types of FOs because well-functioning FGs literally develop into AC.

6. Finally, to provide incentive for FOs to register legally with the relevant authority, i.e. the Ministry of Interior (MoI), Ministry of Agriculture, Forestry and Fisheries (MAFF) or Ministry of Commerce (MoC), the registration process should be eased by simply reducing the demand for required documents, expediting registration procedures, and cutting the amount of red tape.

1. Introduction

1.1 Background

1. **In developing countries a large share of the poor characteristically live in rural areas where the main occupation is small-scale farming**. The importance of smallholder agriculture has been recognised and demonstrated by both the international donor community and national governments in their pledge to undertake requisite interventions to enhance and support agricultural development and economic growth. The widespread intervention policy taken by developing countries is to promote the creation of rural producer organisations (Peacock *et al.* 2004; Bingen *et al.* 2003; Chirwa *et al.* 2005). The main rationale behind the establishment of farmer organisations is to provide effective and collective support services to smallholders, thus loosening the major obstacles in productivity improvement, and to enhance self-help and collective power to regulate markets. This implies that in theory farmer organisations should be able to strengthen farmers' bargaining power with external buyers and reduce transaction costs, potentially leading to increased incomes and food security and hence sustained agricultural growth and poverty alleviation (Barham & Chitemi 2008; Bachke 2010).

2. **In Cambodia, over 90 percent of the poor live in rural areas and rely on agriculture for their primary sources of livelihood.** The country's agricultural sector is predominantly characterised by small-scale farming: about 84 percent of rural farmers own less than one hectare of agricultural land (World Bank 2005, 2009a). In addition, the agricultural sector is one of the four major pillars of the economy. It contributed about 34 percent of the country's GDP in 2010 (National accounts statistics, 2011). In addition, the agriculture sector grew by more than 5 percent in 2008 and 2009 and in 2010 accounted for 27.3 percent of total GDP at constant 2000 prices.

3. **Recent research notes the constraints to agricultural development in Cambodia and the challenges that smallholder farmers presently face.** These include poor infrastructure (particularly irrigation and rural infrastructure); insecure land ownership; inadequate access to technology and agricultural extension services; poor access to credit; poor marketing information; poor management of natural hazards (flood, drought and insects/pests); and low public investment in the agricultural sector (World Bank 2009b; Theng & Koy 2011). Some studies suggest that smallholder farmers will not be able to effectively leverage their productivity as well as bargaining power vis-à-vis external buyers unless institutional arrangements for smallholders to form rural producer organisations are put in place, as observed in other developing countries (Couturier *et al.* 2006; Nou 2006; Bingen *et al.* 2003; Chirwa *et al.* 2005; Peacock *et al.* 2004; Abaru *et al.* 2006; Barham & Chitemi 2008). In principle, individual Cambodian farmers are unable to effectively address these shortcomings. In an effort to promote smallholder producer's livelihoods, the

Cambodian government has aimed for agricultural development, which has been stipulated in the Rectangular Strategy (RS), the National Strategic Development Plan (NSDP) and the Strategy for Agriculture and Water (SAW), among others, to recognise and prioritise the promotion of smallholder farming and the establishment of farmer organisations (FOs) as key to rural economic development and poverty alleviation (Chea 2010).

4. **Farmer organisation is a new concept for Cambodian farmers,** even though agricultural cooperatives were set up in the 1960s before civil war broke out (Couturier *et al.* 2006). During the 1990s, some NGOs and LNGOs started to include the establishment of FOs in rural areas in their development programmes, aiming to enhance agricultural productivity and food security of smallholders. With assistance from the FAO, the government took back the initiative on FOs in 1999. The Royal Decree on Agricultural Cooperatives issued in 2001 instituted a formal legal framework recognising FOs and agricultural cooperatives. Since then many FOs have been established with the support of the public sector and NGOs; however, some of the FOs were unable to sustain their activities, and FOs rarely continue when support agencies (NGOs and government sectors) withdraw their support (Couturier *et al.* 2006; Nou 2006; Bingen *et al.* 2003).

5. **The literature shows that since the Cambodian government has articulated FOs as key to rural agricultural and private sector development,** there have been few studies on the effect of FOs on rural livelihoods. Existing studies have tried to determine the status of FOs by assessing the number of organisations, types of organisations, FO registration process, emerging and major issues faced by existing FOs, internal and external factors affecting the success of FOs, and policies and legal framework required to promote FO development in Cambodia (Couturier *et al.* 2006; Nou 2006; Ngin 2010; Chea 2010). However, there is no available research on the extent to which FOs impact on rural smallholders' livelihoods in Cambodia, let alone the differing impacts of the various types of FO and their legal recognition on membership. Better understanding of the impact of FO membership on income improvement would add to knowledge about the FO sector in Cambodia, identifying what benefits FO members are getting and what challenges FOs are facing. These would be useful to inform and re-frame current policy and identify effective ways that could further improve and address the needs of FOs and better support smallholders for poverty alleviation.

1.2 Objectives

6. **The overall objective of the assessment is to assess the impacts of FOs on the food security of smallholder farmers in order to generate pragmatic evidence** that will assist policy makers and practitioners to better support the functioning and operation of FOs. The specific objectives of this evaluation are to: (1) assess the impact of FOs on food security and livelihood of the rural poor; (2) assess FOs' role, operation and challenges for improving household food security; and (3) provide

specific recommendations for changes in legal and regulatory frameworks associated with FOs.

1.3 Definition of farmer organisation (FO)

7. The term farmer organisation is clearly defined in this study in order to frame its scope. Specific definitions of specific FO types are in Section 2.1. The general definition employed by Couturier *et al.* (2006) has been adopted: "Farmer organisations are a collective entity of farmers in a village or in a number of contiguous villages who have come together with common goals for economic benefit related to agricultural activities". In other words, farmer organisations were created by rural farmers and producers to provide services to members to improve rural income or employment opportunity in relation to agricultural activities.

1.4 Report structure

8. This report is structured as follows: Section 2 reviews international as well as Cambodia's experiences in farmer organisations to promote rural livelihoods and agricultural development. Section 3 details the research methodology employed in this impact assessment. Section 4 presents the detailed empirical findings. Section 5 concludes the report with a summary of the policy implications/recommendations.

2. Literature Review

9. This section provides a brief review of the literature on farmer organisations (FOs), but particularly focuses on: characteristics and purposes of FOs, factors affecting FO operation, government regulatory framework to support FOs, and framework to evaluate FOs.

2.1 Characteristics and purposes of FOs

10. Farmer organisations are used as a tool to promote rural development and to ensure food security in a way that complements state development strategies and market approaches. FOs are based on principles of volunteerism, self-help, self reliance, democracy, equality, equity, solidarity and empowerment (Nou 2006). There is no universal definition of FOs; however, farmer organisations, partly defined as community-based organisations (CBOs), refer to collective action of peasant farmers or smallholder farmers to reach common agricultural goals for food security and livelihood improvement (Bratton 1986).

11. FOs emerge in two ways: they can be self-organised or they can be initiated by external agencies. These two forms of FO share some pros and cons in implementation. Some scholars (e.g. Ostrom 2000) argue that self-organised FOs tend to work more sustainably than externally initiated ones because of the former's tendency to make and adapt good rules, and because of a high level of social capital in terms of mutual trust and cooperation among group members. In contrast, Dasgupta and Beard (2007) argue that externally initiated organisations are still functional as long as the principles to form the groups are operated on broad-based participation, democratic decision-making and transparency.

12. FOs have diverse services and functions including: access to production facilities, equipment for production, technical information, technical advising, inputs (seeds, fertilisers, feed, pesticides, fuel), market (transport, trading, market information), financial means, provision of social services (health insurance, literacy) and natural resource management (Bingen *et al.* 2003; Peacock *et al.* 2004; Chirwa *et al.* 2005). However, these functional services can be grouped into only three main services that can be accessed by FO members, which also serve as useful indicators for the evaluation: production assets, production services including access to market, and food production (Bratton 1986).

13. <u>Access to production assets:</u> To observe the impacts of FOs on access to production assets, Bratton (1986) posed several research questions, for example: Can FOs help alleviate the basic resource constraints faced by household members at the level of production? In what ways, if any, do FOs change the production practices of their members? The production assets of farmer groups can be land, labour, draught

power or tools, depending on the type of FO. Bratton (1986) suggests looking at the impacts of FOs on land use (exchange, lending or borrowing), and the size of land holdings that belong to members and non-members. However, exchange of labour and draught power among the rural populace is no longer such a common practice in some developing countries; for instance, in Cambodia the balance has shifted from exchange towards financial returns from hiring or lending.

14. **Access to production services:** Production services refer to any services offered by a group to improve agricultural production; these include extension, credit, input supply and market outlets (Bingen 2003; Peacock *et al.* 2004). The impacts of FOs on production services can be observed by addressing two questions: Can a collective organisation facilitate the distribution of scarce services to farmers? By coming together, can a group of farmers create effective demand and attract central agencies to their locality (Bratton 1986).

15. **Extension services (on production techniques) can be delivered by government extension workers, non-governmental organisations or programmes, or private (fertiliser) companies** (Bingen *et al.* 2003; Peacock *et al.* 2004). By being involved in FOs, farmers are more likely to have frequent contact with extension workers through training or public meetings (Chirwa *et al.* 2005). Sometimes they seek advice from other farmers who have experience of previous extension training. Membership in FOs possibly provides farmers more chances of receiving services from these people. Having received services from multi-groups, some information or services may be redundant, but this may help increase the reliability of said information and services (Bratton 1986).

16. **Credit is another service that is scarcer than technical advice for farmers/peasants in a community**. Farmers who join FOs often hope to access credit. FO members can have more access to credit through loans from other group members, or sometimes from other agencies such as microfinance institutions (MFI) (World Bank 2002; Bingen 2003). Apart from access to loans, FO members' use of borrowed money and loan repayment rate are more efficient than non-members' (Bratton 1986).

17. **Input supply is another service that helps farmers improve crop productivity.** Smallholder farmers often pay high prices for inputs and suffer from unreliable supplies and there is nothing much that they can do to improve this situation (Bratton 1986). Literature shows that FO members are significantly more likely to have access to inputs such as fertiliser than non-members (Bingen 2003; Peacock *et al.* 2004). The cost of inputs though bulk ordering by a group (i.e. FOs members) is lower than through small and piecemeal purchases by individuals because of cheaper bulk road haulage rates and lower per unit transport costs (Bratton 1986; Chirwa *et al.* 2005).

18. **Market outlets are important.** Farmers often produce excess in relation to demand so they need markets to sell their surplus. FOs can help by buying crop produce from farmers at a reasonable price and then selling it to private traders, or

sometimes FOs can facilitate private traders to come to communities by encouraging farmer members to to grow more produce to sell in bulk. (Rweyemamu 2003; Barham *et al.* 2008). With regard to market access, two interrelated aspects are important: distance to markets and transportation costs. Distance affects transportation costs and therefore the level of access by farmers to markets. Some FOs help address transportation costs for their members hence promoting more access to more markets (Bratton 1986; Bingen 2003).

19. **Access to food production:** To assess the impacts of farmers' participation in FOs on food production, the productivity of land, size of production land, and total household production that in turn can be translated into value of production and sale and then into income, should be estimated (Bratton 1986). Types of crops can be divided into main food crops and cash crops. Other household activities such as livestock raising by smallholders, which largely contributes to household food production, should be also included (Davis *et al.* 2010). Furthermore, many other recent studies on the impact of FO on membership also use total household agricultural production as the measure indicators (Miyata *et al.*, 2009; Bachke 2010).

20. Besides the main services that can contribute to the effectiveness of FOs' operation, Bratton (1986) also points out that the collective action of rural producers' organisations cannot serve as a panacea or a stand-alone tool to address food security and poverty without the support of well-developed states and markets. States must allow independent farmer groups to exist and promote the programmes to assist the groups. On the other hand, markets should provide selective incentives to correct smallholders' uncompetitive positions. Moreover, farmer organisations are better at achieving efficiency rather than equity in the distribution of benefits. Efficiency is seen in terms of productivity gain or the involvement of middle peasants/farmers, but not only for the rich (Bratton 1986; Bernard & Spielman 2009; Barham & Chitemi 2009). However, the poorest are still excluded from the groups (Thorp *et al.* 2005).

21. The concept and practice of FOs as a means to achieving agricultural development, food security and poverty reduction at the grassroots level has a long and varied history in Cambodia. According to Couturier *et al.* (2006), about 13,017 farmer organisations had been established by 2005, over 60 percent of which had been formed since 2000. Five different types were characterised: Farmer Group (FG), Farmer Community (FC), Farmer Association (FA), Agricultural Cooperative (AC), and Farmer Federation (FF). The major type of FO is the FG (80 percent), followed by FC (13.6 percent) and FA (5 percent). A recent study by MAFF indicates that about 200 ACs were established by 2010 (Chea 2010).

22. Of these five types of FOS, farmer groups, farmer associations and agricultural cooperatives are commonly operated in Cambodia, with a focus on agricultural development and improving rural livelihoods. The characteristics of these FOs are:

- ***Farmer group* (*FG):*** grass-root level informal group; recognised only by local authorities (village chief or commune council); small size with 10-30 members (sometimes more); its objective is mutual assistance between members.
- ***Farmer association (FA):*** formal or informal group; the formal group is recognised by law and registered at the Ministry of Interior (MOI), the informal group is not recognised by law and not registered at MOI, but is recognised by the local authority; both types are large groups with more than 30 members; their objectives are mutual assistance among members and economic benefits; it is a collective of many farmer groups from contiguous villages.[5]
- ***Agricultural cooperative (AC):*** formal group; recognised by law and registered at the Provincial Department of Agricultural Extension (PDA); large group with more than 30 members; its main objective is economic benefit; often brings together several farmer groups in an area or contiguous areas.

2.2 Factors affecting FO operation

23. Much of the literature addresses the factors affecting the operation of FOs in developing countries. To frame this study we primarily focus only on constraints or challenges and success factors affecting FO operations. We focus first on the challenges and then on the successes.

24. An early study by FAO (1996) points out that the key constraints to strengthening internal capacities of FOs in Cambodia are similar to those in developing countries. These include: (i) paternalistic role of the state in the management of farmer organisations; (ii) top-down attitude towards the management of many FO leaders and government officials, and (iii) FO membership's weak capital base and low sense of ownership.

25. The challenges facing FO operation in a developing country can generally be classified into two groups: organisational challenges and environmental or contextual challenges (Chirwa *et al.* 2005).

1) ***Organisational challenges*** relate to FO members' multiple involvement as owners and suppliers of capital, as clients, and as employees (for some). These

[5] Definition of Farmer Association was amended from its original definition in order to fit with this study. Most of the FOs in this study sample are not recognised by law and not registered at MOI. They are recognised only by the local authority

roles can lead to conflicting interests, which do not arise in the same way in NGOs or private companies. The nature of these conflicts will vary with the regulations under which FOs operate – their own articles or by-laws and national laws relating to different forms of association. For instance, the scale and pricing of services offered to members can lead to conflicts of interest within a group. Members may be more interested in access to low cost services, either through low prices or the payment of dividends in proportion to the use of services rather than capital invested. Other organisational challenges include: problems of collective action arising from lack of individuals' involvement or cooperation to share and solve a problem or action; free-riding by individuals (where an individual shirks responsibility and tries to gain benefits from collective action without incurring some of the costs); lack of basic literacy and business skills; and accountability with tendency for misuse of FOs' resources by FO leaders.

2) ***Environmental or contextual challenges*** concern the context in which FOs operate. In developing countries, these include the physical and natural difficulties in agricultural production (poor soil, uncertain rainfall); poor health status; poor services (absent, late, poor quality and/or unreliable inputs and output markets, and financial, technical and regulatory services obtainable only on unfavourable terms); poor infrastructure (road, telecommunications); unfavourable macro-economic environment (high interest rates and price, trade and general economic uncertainty); low level of wealth and economic activity in rural areas; low levels of literacy; weak and inappropriate institutional environment (poor security, difficulty in separating FO leadership and management from the influence of local authorities and politics, weak enforcement of regulations for FO governance). These environmental challenges exacerbate many of the organisational challenges faced by FOs as they can increase uncertainty around and reduce FOs' benefits.

26. Couturier *et al.* (2006) highlight general constraints affecting all smallholders of FOs' operation in Cambodia and the among these are the effects of natural disaster on production, limited capacity of farmers, lack of collective action by farmers, lack of financial resources, lack of market for agricultural produce, lack of collaboration with local authorities, lack of law enforcement (or state support in the case of resource management communities), changes in farmers' habits with regards to extension services, and delay in loan repayment (saving and credit groups). According to Chea (2010), farmer organisations could not access loans directly from banks and other financial institutions due to strict loan conditions. Other challenges presently facing FOs are the difficulty of registering with local authorities, poor relations with some support agencies, weak institutional capacity, low capacity of members, low participation by women, and poor accounting and general management skills.

27. The greater challenges FO are facing, the greater is the need for external support from government and development agencies, as experienced in many developing countries. Otherwise many FOs are unlikely to survive, limiting their potential impact on livelihood improvement and food security (World Bank 2002; Bingen *et al.* 2003; Chirwa *et al.* 2005).

28. Although FOs confront many constraints, existing literature also highlights the many factors that contribute to FOs' successful operation in developing countries (Crowley *et al.* 2005). These include clear objectives and response to membership needs; equitable participation in decision making, i.e. members have an equitable stake in their organisation; good two-way communication between members and leaders; members voluntarily invest some of their resources in the organisation; effective and transparent financial management; good governance structure (group size and structure, leadership, internal rules); scope and diversity of organisational activities (capacity building, negotiating power, emerging needs of new activities, and increased financial resources); and scaling-up and links with other institutions (Crowley *et al.* 2005; Kachule *et al.* 2005). Further, trust between members and the management committee also contributes to the success of FOs' operation and sustained implementation (Hansen *et al.* 2002). Pomeroy *et al.* (2001) and Pretty (2003) point out that trust takes time and effort to build and is easily broken. Farmers' trust grows as they achieve successful collaboration with leaders. Trust requires good communication and open dialogue between leaders and members to clarify the needs and expectations of farmers. Furthermore, trust is built when leaders share decision making with members, respect concerns, needs and knowledge, and are transparent in their management (Tewari & Khanna 2005). Trust among FO members was also found to be a factor in improving collective marketing performance (Barham & Chitemi 2008).

29. Some literature showcases the success of FOs' operation in Cambodia as being similar to that of FOs in other developing countries. Couturier *et al.* (2006) identify some factors influencing the success of FOs in the context of Cambodia. They are clear structure and regulations, members' compliance with their own regulations, good management and leadership, support from local authorities, level of responsiveness to farmers' needs, level of participation by members, and use of their own resources. Tourism and Leisure (2009) add that for successful operation, FOs also need self-determined/voluntary group membership, savings and intra-lending norms determined by the group rather than imposed from outside, a growing savings corpus (i.e. continuous and regular contributions), link to commercial credit, and support services (training and micro-planning). Other success factors are local authority participation, external support (both technical and resources), and market access (Ros 2010). Ros (2010) also contends that trust among members and members' sense of ownership helps to promote cooperation between farmers and leaders which in turn impacts on the success of an FO's collective work.

2.3 Government regulatory framework to support FOs

30. The Cambodian government has put in place several legal frameworks to support FOs such as the Farmer Association (FA), Farmer Water User Community (FWUC), Agricultural Cooperatives (AC), Union of the Agricultural Cooperative and the Pre-agricultural Cooperative, Community Forestry, Village Animal Health Workers Association and Fishery Community. The legislations (top policy papers) of

the government (i.e. RS, NSDP and others) also recognise the importance of FOs in poverty reduction through improving agricultural productivity and food security. These legal frameworks are administered by various ministries depending on the type of organisation. The MoI is responsible for the legal registration of FAs, while the Ministry of Agriculture, Forestry and Fisheries (MAFF) is in charge of the registration of ACs, FWUCs, Forestry Communities, Village Animal Health Workers' Associations, Fishery Communities and contract farming. The MoC has the mandate over Business Associations, and the Ministry of Industry, Mines and Energy has responsibility for registering small and medium enterprises. However, only agricultural cooperatives and community forestry management are supported by a sub-decree; the others are simply supported by their respective draft sub-decrees and/or *Prakas.*

31. A recent study on policy analysis for farmer organisations in Cambodia suggests that ACs and Farmer Groups (FG) have been playing very important roles in helping farmers to access financial services that offer lower interest rates than private money lenders, which in turn largely contribute to poverty reduction (Chea 2010). Both ACs and FGs also provide different farming services to their members such as credit, savings, agricultural inputs and farming techniques. However the study also found that both ACs and FGs face external challenges in supporting their farmer members. Such challenges include insufficient support from legal framework; absence of a pro-poor financial policy for farmer organisations; limited technical and financial assistance from government agencies and development partners (supporting agencies); insufficient policy on AC support mechanism; absence of a price protection policy for agricultural produce; lack of official guidelines on the establishment and functioning of farmer groups; absence of a legal framework on auditing; and little support from local authorities.

2.4 Framework for evaluation of FOs

32. The literature review suggests that the concept of farmer organisation has been widely used by support agencies and governments to assist farmers and rural people in improving agricultural productivity, food security, and household income generation in tandem with state provision of various regulatory frameworks to support FO operation, and identifies some key benefits and challenges. The potential benefits of FO membership include access to training services, production inputs and market. Capacity building of FOs is classified into technical capacity which refers to the ability to handle tasks, and strategic capacity which entails decision-making and managerial skills. A capacity building process is generally based on several complementary activities: training, implementation, evaluation and reflection.

33. However, benefits will not accrue to the members unless FOs can deal with the key challenges (organisational and contextual) during their establishment and operation. Other common problems faced by FOs are not having enough money to carry out activities, taking on too many activities (and/or non-economic activities), running activities ineffectively, and reaping limited benefits.

34. Benefits and challenges are often at the core of the problem of FO development in Cambodia, yet little is known about FOs' overall impact on households. The study's in-depth examination of FOs focuses on the benefits i.e. impact of participation, and challenges during FO establishment and operation, and the role of agencies and government regulatory frameworks. The study employed mixed methods – quantitative and qualitative. Qualitative methods explored in-depth information on the FOs' establishment, challenges, roles of support agencies, and government regulatory framework, while the quantitative tools and techniques captured and analysed the impact of FO participation on household food security, using agricultural productivity (value of production) and profit as proxies (Bratton 1986; Miyata *et al.*, 2009; Bachke 2010; Davis *et al.* 2010).

3. Methodology

3.1 Defining the assessment indicators

35. There are number of proxies for food security such as food production, household incomes and expenditure, calorie consumption and nutritional status (Riely *et al.* 1999). However, the selection of a proxy basically depends on the availability of survey data. It was originally planned to use agricultural productivity and agricultural cost and income with a focus on rice, livestock and vegetables as the proxies for food security because these are critical to food production, given that Cambodia is an agriculture-based economy. Instead of analysing total agricultural productivity[6], this study decomposed this variable into rice, livestock and vegetables so that the impact of FOs could be detected on the performance of households in each sub-sector (Table 3.1). Thus, the evaluation indicators for the study are as follows:

Table 1: Assessment indicators of food security

Variables	Description
Rice productivity	Value of rice production or rice revenue per hectare
	Rice profit per hectare (taking cost into account)[7]
Livestock productivity	Livestock production revenue (livestock income per household)
	Profit of livestock production (taking costs into account)
Vegetable productivity	Value of vegetable production or vegetable revenue per 10a (1000 m^2)
	Profit of vegetable production (taking costs into account)

3.2 Data collection methods

36. Quantitative data and qualitative information were collected for this impact assessment. Quantitative data was derived from a household survey of FO and non-FO members. Qualitative information was gathered through key informant

[6] Agricultural productivity is defined as the value of production or revenue per unit area for crops and per household for livestock.

[7] Rice and vegetable production costs only take into account operating costs such as seeds, fertilisers, pesticides, gasoline for irrigation, and land rental fees; animal production costs include cost of calves, piglets, chicks, ducklings, animal feed (if bought), medicines and veterinary services.

interviews (KIIs) among selected stakeholders and focus group discussions (FGDs) with FO members.

1) ***Household survey:*** A structured questionnaire was used to gather information on the FO members' and non-members' households (Appendix 1). Household heads, the spouse of household heads or other adult family members were interviewed face-to-face. Sixteen enumerators were hired and trained for primary data collection; field testing was conducted using a structured household survey instrument so as to ensure the quality of the data collected. Four interview teams, each of which had four members with one team leader/ supervisor, were formed. The team leaders were trained in the method for selecting sample household for interview and checking the quality of their team members' work. The team leaders worked closely with one provincial extension officer (field facilitator) to facilitate data collection and select FOs and households for interview. The data from the household survey was managed through the process of coding, cleaning and data entry using SPSS. Data analysis was carried out using the STATA package.
2) ***Key Informant interviews:*** Semi-structured and open-ended questions with different key informants were conducted using key guide questions (see Appendix 2).
3) ***Focus group discussions:*** FGDs with members of FOs were held using the same key guide questions (see Appendix 2).

3.3 Sampling procedures

37. Household Survey. Since CDRI could not access an updated list of FOs in the selected study locations, existing lists of FOs in the four provinces were used as a sampling frame[8]. Three steps were taken to obtain the sample. The first involved the selection of 54 FOs based on simple random sampling and proportionate to the number of FOs located in each province[9]. The number of farmer groups, farmer associations and cooperatives was calculated based on the proportions of 50:30:20 percent, respectively, of the total selected FOs, resulting in 29 farmer groups (FG), 15 farmer associations (FA) and 10 agricultural cooperatives (AC) (Table 3.2).

[8] The list of FOs gathered by the Department of Agricultural Extension (MAFF) was presented in Appendix 2 of the revised Interim Report sent to the World Bank, and therefore is not appended in this report.

[9] Total number of 54 FOs was agreed in the second meeting between CDRI, the World Bank and AusAID on 29 November 2010.

Table 2: Proportionate selection of FOs by type

Provinces	Existing FOs in targeted areas				Selected FOs for study			
	Total	FG	FA	AC	FG	FA	AC	Total
Kampong Thom	328	217	100	11	7	5	3	*15*
Battambang	411	210	156	45	9	6	4	*19*
Svay Rieng	573	533	36	4	10	2	1	*13*
Kampot	143	115	18	10	3	2	2	*7*
Total	**1455**	**1075**	**310**	**70**	**29**	**15**	**10**	**54**

38. The second step was to identify the target districts in each province. Two to three districts, which have majority of the three FO types, were selected. The exception was Svay Rieng where FGs were predominant only in a few districts and only a few FAs and ACs were present in some districts. Because of this, one district with a high number of FGs and another, which has both FAs and ACs, were chosen. After selecting the target districts, the FGs, FAs and ACs in each district were listed with their corresponding locations; the FGs, FAs and ACs were then subsequently drawn using systematic random sampling. To get the needed samples for the FG, FA or AC, the total number of FOs (FG, FA and AC) in the selected districts in each province (N) is divided by the desired number (n) of FOs in each province to get the selection interval for each FO (I). To get a random number (R), the last digit (or the last two digits if the FO list had three digits) of the serial number on a bank note, which was randomly selected from a pocket, was used. Suppose the total number of FAs in selected districts/province was 49 (N=49) and the desired FA sample within that province was 5 (n=5), then the interval I=49/5 = 10. If the last digit of the bank note serial number was 5, the FAs were selected as follows:

FA 1 = R = 5
FA 2 = 5 + 10 = 15
FA 3 = 15 + 10 = 25
……
FAs numbered 5, 15 and 25 on the list would be the 1st, 2nd and 3rd FAs selected in that province (Table 3.3).

Table 3: Details on location of FOs and survey households in targeted districts

Province	District	Commune	Selected FOs			FO members HH			Non-members	Grand total
			FG	FA	AC	FG	FA	AC		
Kg Thom	**Kampong Svay**	Tbaeng	2	1	1	10	7	8	28	**53**
		Trapeang Ruessei	1	1	1	5	7	8	22	**42**
		San Kor	2			10	0	0	12	**22**
		Kampong Kou	1	1		5	7	0	13	**25**
	Stungsen	Sroyov	1	2	1	5	14	8	29	**56**
Total			***7***	***5***	***3***	***35***	***35***	***24***	***104***	**198**
Battam-bang		Ta Meun			1			8	9	**17**
	Thma Koul	Ou Taki	4	1		20	7		31	**58**
		Kouk Khmum		1			7		7	**14**
	Aek Phnom	Preaek Luong	1	2	1	5	14	8	29	**56**
		Peam Aek	3	1		15	7		25	**47**
	Sangker	Ta Pon	1	1		5	7		13	**25**
		Ou Dambang Pir			1			8	9	**17**
		Norea			1			8	9	**17**
Total			***9***	***6***	***4***	***45***	***42***	***32***	***132***	**251**
Svay Rieng	**Svay Chrum**	Kouk Pring	2			10			12	**22**
		Ta Suos	2			10			12	**22**
		Pouthi Reach	1			5			6	**11**
		Chambak	1			5			6	**11**
		Kampong Chomlong	2			10			12	**22**
		Kraol Kou	2			10			12	**22**
	Kampong Rou	Samyaong		1	1		7	8	16	**31**
		Preah Ponlea		1			7		7	**14**
Total			*10*	*2*	*1*	*50*	*14*	*8*	*83*	**155**

Kampot	**Chhuk**	Chhuk	1			5			6	**11**
		Satr Pong	1	1	1	5	7	8	22	**42**
	Chum Kiri	Snay Anhchit	1			5			6	**11**
		Srae Samraong		1	1		7	8	16	**31**
Total			***3***	***2***	***2***	***15***	***14***	***16***	***50***	***95***
Grand total						**330**			**369**	**699**

Note: number of non-member households: FG=6; FA=7; AC=9

39. The third step was the selection of household interviewees. Based on the literature, farmer groups are small and informal (from five to 30 members), and farmer associations and agricultural cooperatives are large and formal (from 30 to 150 members). For the survey of FO members' households, ***five, seven and eight*** members were randomly selected from each randomly selected farmer group, farmer association and agricultural cooperative, respectively. For the survey of non-FO members (comparison group), six to nine households were selected by systematic random sampling from the same villages or communes that the FO members were selected from (the village household list was used to select non-FO members for the comparison group). The total survey sample comprises 699 FO and non-FO members, 330 of which were FO members (members group) (Table 3.4). The FO samples used in this study are those that only concentrate on production of crops (rice), livestock and vegetables.

Table 4: Number of survey households

Provinces	Selected FOs for study			Selected HHs for member groups			Non-member groups	Total
	FG	FA	AC	FG	FA	AC		
Kampong Thom	7	5	3	35	35	24	104	198
Battambang	9	6	4	45	42	32	132	251
Svay Rieng	10	2	1	50	14	8	83	155
Kampot	3	2	2	15	14	16	50	95
Grand total	***29***	***15***	***10***	***145***	***105***	***80***	***369***	***699***

40. KIIs and FGDs. Approximately 30 key informant interviews (KIIs) and six focus group discussions (FGDs) were conducted. KII respondents are listed in Appendix 3. Two FGDs were held in both Kampong Thom and Battambang, and one each in Svay Rieng and Kampot. FGD participants (six to nine persons) were randomly selected from the FOs that were surveyed.

3.4 Analytical framework, study hypotheses and empirical analysis

41. The unit of analysis for this study is the household, since the impact of FOs on food security is generally observed at this level (Miyata *et al.*, 2009; Davis *et al.* 2010; Bachke 2010). In the empirical literature, participation in a FO is based on the models of binary or dichotomous choice, where a household member chooses to participate in a FO when it perceives benefits from participation (for further details, please refer to equation 1 in Appendix 5).

42. Thorp *et al.* (2005) point out that the poor may be less likely to form a group in the first place and the poorest might be excluded in successful groups due to their lack of assets and limited access to networks and markets. In Cambodia, however, FOs are basically dependent on support agencies because farmers' management skills and general level of education are limited (Couturier *et al.* 2006). Observations during the preliminary pilot test seem to partly contradict the argument of Thorp *et al*. (2005) because FO participation in Cambodia can help farmers with limited assets (collateral) to access credit at a lower interest rate.

43. Thus, the first set of hypotheses is:

- **Hypothesis 1a:** Households with higher levels of human capital are less likely to participate in FOs, while poor households with lower levels of human capital are more likely to do so.

- **Hypothesis 1b:** Households with higher levels of productive capital are less likely to participate in FOs, while poor households with lower levels of productive capital are more likely to do so.

The dependent and explanatory variables of the empirical framework and the definitions to the elements of equation (1) (in Appendix 5) are specified in Tables 4.5, 4.6 and 4.7 in Section 4. To link the participation behaviour of households to the potential outcomes of participation, we adopted a risk-neutral form that maximises profit, π, through increased agricultural productivity (Bachke 2010; Ali & Abdulai 2010; Davis *et al.* 2010).

44. Given the above explanation, it is hypothesised that:

- **Hypothesis 2a:** FO members' revenue and profit from rice and livestock farming are likely to be higher than those non-FO members.

- **Hypothesis 2b:** The revenues and profits from rice and livestock among FG members are more likely to be higher than among non-FO members.

- **Hypothesis 2c:** The revenues and profits from rice and livestock among FA members are more likely to be higher than among non-FO members.

- **Hypothesis 2d:** The revenues and profits from rice and livestock of AC members are more likely to be higher than among non-FO members.

45. The analytical framework enables us to explain the quantitative impact of FO participation but the effects of different types of FOs on members' livelihoods cannot be reflected in the framework. However, anecdotal information from the pilot study indicated that the operations of some FAs and ACs are legally recognised by the government, which possibly provides them with more incentives than the FGs. Therefore, the third set of hypotheses is as follows:

- **Hypothesis 3a:** The revenues and profits from rice and livestock of FA members are more likely to be higher compared to that of FG members.

- **Hypothesis 3b:** The revenues and profits from rice and livestock of AC members are more likely to be higher compared to that of FG members.

Testing the above hypotheses entailed Propensity Score Matching (PSM) approach[10], which is backed up by Ordinary Least Square (OLS); the detailed technical explanation is in Appendix 5.

3.5 Limitations of the study

46. Given that the FO samples are relatively small and draw only on some FO types and selected locations, the study findings may not be "generalisable" to reflect the issues of the FO sector in Cambodia as a whole. Some caution would need to be taken in further extrapolating the findings to wider groups and locations. None of the sample FAs are officially registered at the MOI; they also are recognised only by local authorities. Based on the earlier definition, FAs are informal groups and their business activities may be limited; hence the effect of membership may be underestimated. Therefore, the findings reflect the sampled FAs for this study only.

47. Vegetable crops are not grown by many households in both groups. About 25 percent (98 out of 365 households) of non-members cultivated vegetables during the past harvest year compared to 40 percent of members (133 out of 330 households). In addition, when we tried matching sub-sample FG, FA and AC members with non-members, the sample became smaller and the matching could not reduce the bias of covariate differences. The small number of sample households that cultivated vegetables meant that the research team could not include the vegetable sub-sector in the empirical analysis. Therefore, only rice and livestock sub-sectors are included in the empirical analysis as proxies of agricultural productivity variables. However, all three sub-sectors are presented in the descriptive analysis.

[10] Some studies have also used PSM on cross-sectional data to assess the impact of participation in intervention programme, for instance, Davis et al. (2010) "Impact of Farmer Field Schools on Agricultural Productivity and Productivity and Poverty in East Africa"; and Ali & Abdulai (2010) "The Adaptation of Genetically Modified Cotton and Poverty Reduction in Pakistan".

4. Results and Discussions

4.1 Qualitative findings

4.1.1 Purpose of participation in FOs

48. Key informant interviews and focus group discussions reveal that majority of FO members – Farmer Group (FG), Farmer Association (FA) and Agricultural Cooperative (AC) – expressed that their primary reason for membership is to save money and borrow money at lower interest rates (2-3 percent per month) to reduce their dependency on private moneylenders, who charge high interest rates, or other microfinance institutes (MFIs). A particularly important benefit is that FO members, especially self-help groups (SHG), can access emergency loans for a short period of time at no interest, for instance to cover healthcare costs if a family member is sick, to pay school fees or buy school materials for children. This is consistent with a previous study by Chea (2010), which also found that ACs' and FGs' main activities are savings and credit services, encouraging FO members to access low interest loans for investment in agriculture. Chea's household survey also confirms this qualitative finding, i.e. credit access is a positive and significant determinant to assess the impact of rural households' participation in FOs (see section 4.1.2).

49. Improving agricultural productivity through technical assistance and inputs provided by support agencies is another important reason for participating in FOs, according to the qualitative findings. Technical assistance includes training on how to improve crop production (rice and vegetables), and livestock raising, while inputs support includes seeds, livestock and poultry for raising, whether free or on credit, and some capital support (some FAs and ACs). It was found that in a few cases, support agencies (NGOs and the Office of Agricultural Extension/OAE) helped with market access by facilitating the market connection between FOs and major buyers, for instance restaurants and a casino. This was found only in Svay Rieng province, where a NGO called International Volunteers Yamagata (IVY) and the OAE (of the PDA) assist FOs to make contracts with casinos to buy their vegetables at agreed prices and amounts every twice weeks. This kind of market accessibility is not common in the other study areas (see Box 1).

Box 1: Example of a Successful Vegetable Association in Svay Rieng Province

The Svay Rieng Vegetable Supply Association is a farmer group in Svay Rieng province. Its approximately 273 members come from 40 villages, about 15 farmers from each one. Facilitated by the International Volunteer Centre of Yamagata (IVY), the association was established in 2008 but is yet to be certified and recognised as a registered association by MoI or MAFF. The association aims to improve members' agricultural productivity and help them access markets to sell their produce. Before the association was formed, the main problem that farmers had was lack of technical knowledge to improve cultivation and marketing of their produce. Related to market, some farmers had no option other than to sell their vegetables at markets near their village where produce fetches lower prices and sometimes they had surplus which they could not sell (oversupply of vegetables).

All association members receive assistance from IVY which cooperates with the OAE to seek markets for their produce, such as a casino in Bavet (Cambodia-Vietnam border) which buys 300-400 kg of their organic vegetables twice per week (on Mondays and Thursdays). The main activities of the association are to grow vegetables, mainly tomatoes, cucumbers, yard long beans, morning glory and egg plants, and market the produce. The association's main clients are the casino in Bavet and one restaurant in Phnom Penh; members individually take any remaining produce to sell in the local market near their village. Almost all the members are household- vegetable producers. They take turns in selling vegetables to the regional collectors in order to supply a casino. If the members whose turn it is have not produced enough to meet the clients' orders, the regional collectors make up the shortfall by buying vegetables from the members who are next on the rota.

The great successes of the association relate to marketing, pricing and increasing the number of vegetable producers in the community. Members are able to sell their produce to a casino at higher prices than they can get on the local markets. Further, members even have more time for other business activities because they are paid directly in cash when their produce is picked up by the regional collectors (association). If farmer members are left with produce surplus to the casino's requirements, they are able to sell it at local markets in or near their villages where organically grown vegetables fetch about 200 to 300 riels (USD0.05 to USD0.07) more than the vegetables imported from Vietnam. The villagers only buy Vietnam-grown vegetables if the local organically grown vegetables have sold out. One new development, considered as positive progress for this association, is the agreement to supply a restaurant in Phnom Penh with organic vegetables once a month. These positive changes are remarkable achievements for the association and its support agency, both of which have made efforts to respond to members' needs.

One of the main factors underlying this group's success is the *positive incentive* provided to its leaders and members, which motivates them to participate in the association's activities. For example, besides the profit they make from growing vegetables, each management committee member is given a cell phone, USD5 per month for a pre-paid phone card, and a monthly salary of about 30,000 riels (USD7.39), while each regional leader receives only USD2 per month for a phone card. The association also tries to encourage its members by giving a gift to those who produce a lot of vegetables to sell to the association; so far, several farmer members have received gifts, such as a T-shirt, as an acknowledgment of their effort and commitment. Other important factors considered as strong elements contributing to the association's success and farmers' active participation are: *honesty*, *good relationship* and *good cooperation* among members and the support agency.

There are other benefits that the members derive from the association, thereby strengthening its function, operation and success. For instance, members can buy agricultural inputs such as equipment, materials and seeds from the support agency; access technical support and advice on how to grow vegetables and overcome cultivation problems from model farmers and

selected association members trained by IVY (one per village). With IVY as its support agency, the association can also get an interest-free loan of about USD4000 for capital to run the business (buying vegetables from members and selling to the casino). The association provides other necessary equipment such as baskets to store vegetables and a vehicle for collecting and delivering vegetables.

Even as the association has improved, it still faces many challenges. Technical knowledge on vegetable cultivation is still limited among members and some technically knowledgeable farmers directly trained by IVY cannot provide enough useful technical knowledge or even support all the members. There are households who still lack capital to buy inputs to improve their agricultural productivity, especially vegetable growing.

The association is currently seeking extra markets for its members' vegetables, especially restaurants and other markets in Phnom Penh where demand for vegetables is higher and prices are better. In order to ease business operations and build trust with outsiders, especially with clients for contract farming, the association plans to upgrade to agricultural cooperative status by registering at the Department of Agricultural Extension in Svay Rieng.

In short, key to the success of the Svay Rieng Vegetable Supply Association are: (i) addressing the needs of association members (marketing); (ii) the role of the support agency in assisting, strengthening and facilitating the association since its formation, providing technical assistance, capital inputs, essential equipment and the means to start and support its main business activities; (iii) positive incentives provided to the management committee and outstanding members so as to encourage active participation in the association's business; and (iv) honesty, good relationship and good cooperation among members and the support agency. Despite its strengths and successes, this association still faces many problems – several members' lack of capital to buy inputs for farming, and lack of technical knowledge to improve their productivity.

50. Besides the economic benefits, farmer members in the study areas joined a FO because of the benefits of building good relationships and mutual help in the community, learning about improved agricultural practices from each other and sharing experiences. The study also found that some FO members joined the groups by unwillingly following others in their villages, while others did not have a clear understanding about the concept of FOs. These farmers were told that their livelihoods would be improved after joining the group (FO), but once they had joined most of these members were reluctant to participate in any of the groups' activities; hence, the overall low performance of the groups.

4.1.2 Who mostly participates in FOs

51. According to qualitative interviews, most of the FOs in the study areas were formed by support agencies (e.g. government agents or NGOs[11]). Therefore, the farmers who joined these FOs are likely to reflect these agencies' objectives. For instance, support agencies like CARITAS, Rural Poverty Reduction Programme (RPRP), Village Support Groups (VSG), and/or IVY target particular groups such as poor farmers, people with disabilities or women-headed households in order to

[11] Both International non-profit organisations and local NGOs

provide special services and to improve their livelihoods. For this reason, poor farmers, people with disabilities or women-headed households were purposively selected to join FOs such as FGs and/or FAs. CEDAC and World Vision take a different approach, in that poor or rich community members, regardless of particular social standing, can participate in the groups on a voluntary basis and as long as they respect the rules and regulations in principle. This indicates that said support agencies may believe that farmers with different levels of social status (rich, medium and poor) work well as a group, and could complement each other in such a way as to improve livelihoods, especially for the poor. This thinking is also evident during the post-market liberalisation in African countries where poor smallholders form producer organisations (i.e. FOs) in order to improve agricultural productivity, food security and smallholders' access to market (Dorsey & Muchanga 1999; World Bank 2002; Chirwa *et al.* 2005). However, some studies show that the poorest members in such groups benefit the least from membership or are exploited (Bingen *et al.* 2003; Thorp *et al.* 2005).

52. There was no evidence of any exclusion or exploitation of the poorest in the sample FOS, but the results did surface a critical failure in that due to lack of assets, capital, low education or low management skills, FOs are working with only the poorest farmers, especially informal farmer groups. Learning from past unsuccessful experiences, some support agencies have changed their approach: for instance CARITAS decided to welcome volunteer farmers with poor or medium well-being status to participate in their FOs so as to sustain their development programme. Similar shortcomings were also found in some African countries: FOs' performance was not successful when the membership was composed of only the poorest farmers (Thorp *et al.* 2005).

> …at the start of this association, *Angkar Arkpiwat Setrey* (women's development organisation), accepted only the poorest as group members, farmers who had no farm land, no proper house, or lived in a thatch-roofed house. Later on, the association included poor to medium farmers, who have 3 rais (4800m²) of farming land, raise livestock, but have limited resources (money) to send children to school or buy materials for their house. Rich farmers are not allowed to participate in our group; if they already have a good livelihood, they will not be allowed to join... (FA Leader, Battambang).

4.1.3 Process of FO establishment

53. Majority of the FOs were initiated by outsiders (e.g. government, NGOs); none of the sample FOs was self-established (Table 4.1), whereas more than 60 percent were reportedly established by support agencies. That FOs were established in different ways, depending on the type of support agency, was also reported during the semi-structured interviews.

Table 4.1: Support agencies in establishment of FOs

	Farmer group		Farmer association		Agricultural cooperative		All FOs	
	n	%	n	%	n	%	n	%
Support agencies / NGOs	100	68.97	65	61.9	39	48.75	204	61.82
Local authority	20	13.79	18	17.14	25	31.25	63	19.09
Self established	-	-	-	-	-	-	-	-
Do not know	25	17.24	22	20.96	16	19.00	63	19.09

54. Farmer groups (FGs) were formed in two ways: one, before introducing agricultural technical training (e.g. how to grow rice, vegetables, raise animals); two, after training had been extended. Membership in a FG is voluntary and members are expected to respect the group's rules and regulations.

55. The typical process of forming a FG after training is reportedly as follows.

1) **First,** the support agency consults local authorities (commune and village chiefs) to introduce the FG concept and to inform them about the development project plan for their commune and village. If the discussion with the authorities is successful, the support agency requests their help to gather farmers in the village to attend agricultural technical training at a specific date and time. The farmers invited to the training are purposively or freely selected depending on the development objectives, particularly according to the support agency's strategies.
2) **The second step** to FG formation entails the conduct of agricultural technical training by support agency staff. As part of or at the end of training activities, support agency staff introduce the FG concept to the participants and find out what they think about it and whether they are interested in setting up a group. Interested participants gather to form a group facilitated by support agency staff; FGs generally have less than 30 members. Next, an election to choose the group's management committee including a leader, deputy leader (optional), treasurer, and secretary is held; all members have a vote. After electing the management committee, group members are encouraged to build up the group's objectives and to set rules and regulations for their group's functions and operations, including core activities: savings, credit schemes, rice cultivation, vegetable growing, livestock rearing, rice banks and/or cattle banks.
3) **The third step** takes place after all the necessary arrangements for the group formation have been agreed upon; at this point, the group must be introduced

to local authorities (commune and village chiefs) so as to be recognised and to confirm the outcome of the earlier meeting between the support agency and local government – that a farmer group has been established in the community. Once the group has been recognised by the local authorities, it is able to take action to follow its own objectives.

56. With regard to FAs, though these groups of farmers call themselves a "farmer association" they are not legally recognised as such because they have no certificate nor are they registered with the MoI. Generally, the process of their establishment and their functions and operation are very similar to FGs', but FAs have more than 30 members. However, in some areas FGs are trying to slowly transform their functions to become a farmer association or agricultural cooperative. Albeit they are not recognised by law, this transformation could help the organisation as they adopt more complex management and administration procedures ,which will facilitate their eventual legal registration (see Box 2).

Box 2: Example of the Function and Operation of a Highly Complex FG as an "Association"

The Svay Rieng Vegetable Supply Association, with its some 273 members from 40 villages (with about 15 farmers from each village), has three levels of management: a group of leaders (one for each farmer group), 14 zone leaders, and a management committee of seven members.

First time around I was elected to be the group leader of a self-help group. After that I was elected to be one of the 14 zone leaders. Then I was elected to the farmer association committee (FA leader, Svay Rieng).

The group holds a monthly meeting with the committee members in order to report on all the association's activities, such as the amount of vegetables that have been sold per month.

To become a member of the association, it is necessary to pay a one-off fee of 5000 riels on joining, to have land for growing crops and vegetables, to be a hard worker and to be prepared to produce more vegetables to supply clients' demands.

We keep a record book and note everything related to the activities of our association members. Every two months, the 14 zone leaders are invited to join the management committee meeting. As a general rule, no matter how rich or poor they are, we accept all those who apply for membership if they have land to grow vegetables (FA leader, Svay Rieng).

Two different forms need to be filled in to become a member of this association: one is the member's background information, signed with the member's thumb print; the other is the contract between the member and the association, including the list of vegetables s/he has been assigned by the association to produce.

Note: Membership fee is 5000 riels, paid only once on joining and is effective for the member's lifetime, thus membership fee is considered as nil (member cost=0)

57. For agricultural cooperatives (ACs), the majority evolved from farmer groups (FGs) which passed the PDA's or MAFF's evaluation process. An agricultural cooperative, according to the AC Draft Law, is an economic enterprise based on agriculture. It adopts the principles and values of international cooperative alliance (ICA): (1) Voluntary and Open Membership, (2) Democratic Member Control, (3) Member Economic Participation, (4) Autonomy and Independence, (5) Education, Training and Information, (6) Co-operation among Co-operatives and (7) Concern for Community (these principles are detailed in the draft AC law).

58. According to the Third Draft Law of AC, there are five important steps involved in the process of establishing an AC which are summarised below:

Step 1: Introduce cooperative concepts to farmers. The support agency collaborates with the OAE to help FG members understand the registration procedure and the Royal Sub-decree on Agricultural Cooperatives by conducting orientation and training courses. Ordinarily, this orientation and training is held in all the villages where the AC members live; the training takes one day in each village.

Step 2: Introduce the Royal Decree on the Establishment and Functioning of ACs and model statute of agricultural cooperative to farmers. The FG convenes a meeting of all members to elect five members to sit on the Board of Directors and three members for the Board of Auditors.

Step 3: Conduct meeting with farmers to select candidates for the Board of Directors and Supervisory Committee, and propose logo, names, business types, shared values, membership fees, statute of cooperative and others. The OAE has to provide one more training course on the Royal Sub-decree on Agricultural Cooperatives to the elected directors and auditors in order to explain the AC model and legal registration procedure.

Step 4: Conduct first general meeting to discuss and adopt the proposed items in step 3 to set up the AC. The first meeting, to which guests such as the provincial and district governors, local authorities (commune and village chiefs), provincial agricultural officers and support agencies are invited, is held to finalise agreements and documents such as internal rules and regulations with all members**.**

Step 5: Facilitate elected Board of Directors and Supervisory Committee to prepare required documents to get registration certificate. All statutes and other documents approved in the meeting are put together with the application form for legal registration at the PDA. Once the PDA has issued a certificate, the FG is legally recognised as an AC. The PDA sends the documents to MAFF which holds the list of registered ACs.

59. Key informants and FGD participants noted that cash credit and savings are the main activities of FOs in the study areas. Other activities such as cow and rice banks, agricultural inputs trading (fertiliser, seeds, seedlings, fingerlings, equipment), small-scale businesses (grocery shops, general stores, handicrafts) are not active. Agricultural production (rice, vegetables, livestock) is done on an individual

basis, and selling agricultural produce is also done individually. Collective marketing was rarely observed in the study samples.

60. These findings suggest that the establishment of FOs varies according to their type, and support agencies play a critical role in assisting their establishment. Although the process varies according to the support agency's strategies and objectives, some commonalities were found. Most well organised and strong farmer groups had been encouraged to register with the relevant authority so they would be recognised by the government. Overall, the FAs and ACs in the study areas have mostly evolved from FGs, which in turn originated from self-help groups.

4.1.4 Existing legal framework and its benefits

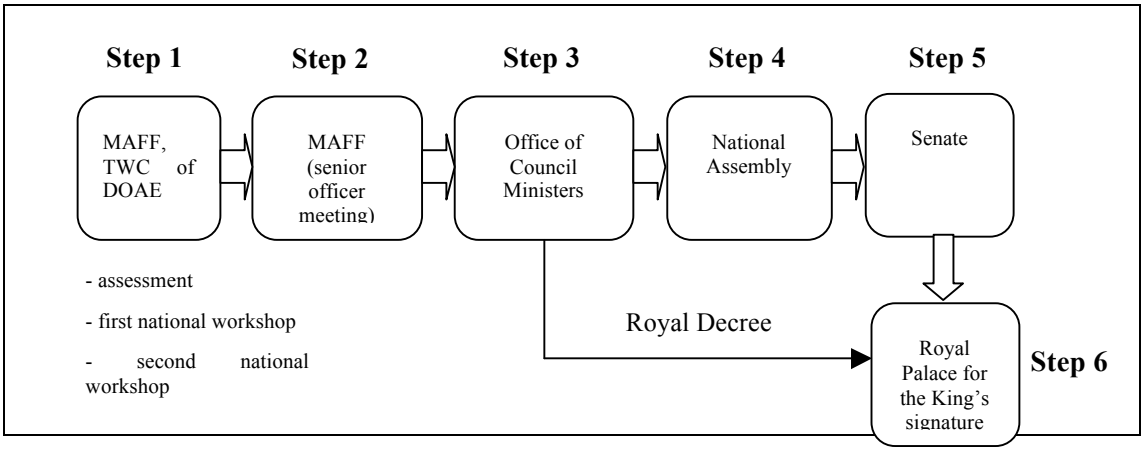
61. Establishing farmer organisations is one of the Cambodian government's strategies for addressing agricultural sector constraints, and is seen as a mechanism for encouraging the development of sustainable activities and facilitating relationships with both local and international organisations (Chea 2010). The legal framework sets out that ACs can be legally registered under MAFF and FAs under MoI. The FGs are only recognised by local authorities. The major benefit to registration is that legal recognition by government makes them (FAs and ACs) eligible for other benefits from government as well as outsiders and even from other support agencies, such as in bidding for projects (e.g. providing agricultural training courses to other communities). Legal status also attracts other institutions' interest in terms of further mutual objectives and business activities. However, though there is legal framework to support registration, only ACs are supported by Royal Sub-Decree (by law), whereas the FAs are still supported by a *Praka*s, dated 1994. An interview with a government official in charge of registering FAs revealed that the government is working on a draft law to promote civil society, including farmers associations. The interviewee also added that they only know how many FAs are registered, but did not know what activities these registered FAs are involved in, and when FAs change their status and their name, they do not report the information to the registration department. Field observations and key informant interviews confirmed that though many FOs are legally registered as a FA at MoI, their activity and structure is more akin to a NGO.

62. MAFF has recently been promoting agricultural cooperatives in order to: (1) enable farmers to get advantages from the agriculture sector (sharing economic growth); (2) encourage farmers to work collectively (3) solve problems as a group; (4) gather human resources; (5) strengthen marketing through collective selling and buying; (6) forge business links with investors; and (7) facilitate transfer of agricultural techniques and services to farmers. In addition, MAFF has drafted a law for the ACs to upgrade the existing Royal Sub-decree, by adding other support strategies to protect and give more advantages to the farmers.

...Government is willing to establish legal framework for ACs in Cambodia so as to improve Cambodian farmers' productivity and livelihoods, and to protect and to empower farmers. However, government does not have to force existing farmer organisations to legally register as a bona fide Agricultural Cooperative; it is on a voluntary basis (MAFF, Phnom Penh)

63. There are six steps before the AC Law is passed. At the time of study, the draft law was at the second stage, awaiting MAFF approval before being put the Office of the Council of Ministers (please see Figure 1 for detailed information). It is also noted that the Royal Sub-decree on AC establishment did not go through the national assembly and senate.

Figure 1: The AC law establishment process in Cambodia



Note: TWC stands for technical working committee

4.1.5 Role and challenges of support agencies

64. Support agencies are the public sector institutions and NGOs that assist and sustain the functions and operations of FOs. Study results show that most FOs are formed by the support agencies (Table 4.1). They then take a critical role in assisting the operation of FOs, including capacity building (technical and management skills), facilitation and follow-up, networking, and inputs provision (agricultural materials and capital). For FGs, FAs and ACs in rural areas, market access assistance is much less active because FO members still largely sell their produce and buy inputs on an individual basis (see empirical analysis below for further detail).

65. In the literature, the private sector or commercial companies are said to play a significant role in supporting FOs (providing inputs, credit, technology and buying outputs by contract farming) (Kachule *et al*. 2005). However, only two types of support agency were found in the study areas: (1) public sector (OAE of PDA), and (2) NGOs and donors (such as those created by International Fund for Agricultural Development (IFAD). The PDA is a representative of MAFF, which is responsible for providing long-term support to ACs by facilitating their formal registration, operation, implementation, market access and benefits sharing[12]. In addition, MAFF provides capital and agricultural technical training courses to operating ACs. The OAE of PDA invites major clients (big restaurants, casinos and hotels) to visit the communities where FOs are located as a way of showcasing farmers' produce and promoting marketing assistance, which could eliminate price exploitation by middlemen and strengthen producers' bargaining power for better prices with buyers and traders.

> *… I think that Svay Rieng Office of Agricultural Extension of Provincial Department of Agriculture is helping our team a lot. They have helped us to complete all the registration forms and write our cooperative's statute. Moreover, it has provided 1,000,000 riels (USD246; USD1=4060 riels) as input capital as well as agricultural techniques. Our cooperative is still receiving assistance from the PDA* (leader of AC, Svay Rieng).

66. This is a good example of support for an AC located in one of the study areas. However, market access assistance and capital input provision to ACs from PDA is not common in the other study areas. The credit support could be taken to imply that these ACs have insufficient capital to run their activities, and thus PDA has stepped in to support their operations. On the negative side, grassroots organisations' decision-making and governance may be influenced by the public sector, even though the ACs reported that their governance is not interfered with.

67. NGOs, as part of their development mandate and mission, have an important role in improving rural livelihoods in Cambodia by promoting agricultural production and market access. The establishment of rural community producer groups implies that NGOs can easily access and assist smallholders to improve their livelihood. In addition, building FOs and allowing these to operate independently may be a good rural development initiative in developing countries such as Cambodia. Study findings show that NGOs provide assistance to all three types of FO captured in the assessment in the form of agricultural technical training, inputs (seeds, livestock, agricultural equipment), but active support to access markets for both inputs and agricultural products remains largely non-existent.

[12] In this case PDA assists ACs to make sure that the profits are distributed equally to all members, but does not interfere in ACs' activities or decision-making.

68. The findings also reveal that when an NGO's programme ends, it tries to find another organisation or local authority (government) to take its place so as to ensure FOs' sustained functions and operations. This suggests that support agencies play a significant role in the sustainable implementation of grassroots organisations, and may also reflect the fact that the FO sector in Cambodia is still in its infancy and unlikely to survive independently. This is a common problem for FOs' operation in developing countries, including some African and Asian countries. Many FOs disappear after support is withdrawn, especially input supplies (Bingen *et al.* 2005; Thorp *et al.* 2005).

4.1.6 Challenges to establishment and registration of FOs

69. Establishment-related Challenges. Even though many farmer organisations had been formed in the study areas, it remains a new idea for many farmers. They do not fully understand what FOs are about and sometimes they did not even know FOs had been established in their village. In addition, some FOs had failed and left villagers with bitter experiences; this can have negative impacts on new FOs such that people are reluctant to join.

70. A major concern related to FO establishment is the selection of qualified representatives for the FG, FA and AC management committees. Also, some farmers were reluctant to join because affiliation with an AC requires paying a membership fee and/or buying at least one share, which some poor farmers are unable to afford. Survey results show that about 43 percent are unable to join FOs due to lack of capital to fulfil membership requirements (Table 6). Empirical analysis on FO participation propensity also found that AC members are slightly better off than members of FGs and FAs.

Table 4.2: Reasons for unwillingness to join FO (n=330 households)

Reasons	Yes		No	
	n	%	n	%
Lack of information about participation	202	55.34	163	44.66
Lack of time; commitment	168	46.03	197	53.97
Lack of capital	158	43.29	207	56.71
To join after seeing good results	101	27.67	264	72.33
Venue is far from home	32	8.77	333	91.23
Others (leadership not good enough, no one selected to lead, no FO in the neighbourhood)	50	3.425	1410	96.575

71. Establishing just one AC is time consuming and entails a huge logistical exercise, especially gathering members to the meetings. Setting up an AC necessitates many meetings for members to agree on rules and regulations for their future cooperative, and for the management committee to be trained on accounting, financial management, book keeping and leadership. Also, there are costs involved in organising a general meeting and inviting stakeholders like a provincial or district governor, OAE representatives, NGO staff, to inaugurate the new AC. Fortunately for some ACs, their support agencies cover the costs of this general meeting and other expenses related to the registration process.

72. Challenges in Legal Registration. ACs can be registered at MAFF while FAs can be registered at MoI and the Ministry of Commerce (MoC). There are no registration requirements for FGs, but all FGs are informed or recognised by local authorities (village and commune). Qualitative findings reveal that even though it is easier to legally register as an AC, many FGs are dissatisfied with the time consuming procedures and the number of documents they need to complete for MAFF. FGs would not be able to complete the required registration documents without assistance from support agencies.

73. The ease of registration depends on government policy and the supporting agencies, which help FGs in preparing to transform to AC or FA. Presently, MAFF is promoting the AC concept through the PDA (OAE), so it is likely that many FGs will register to become an AC rather than a FA. In addition, the legal framework for ACs can be registered at the provincial authority (PDA), which is much easier than at the MoI. FA registration can only be done at ministry level. Registration also requires many documents. Key informant interviews confirm that there is little or no extra benefit (incentive) for legally registered FAs compared with non-registered FAs. Most FAs interviewed are not registered, yet they can still operate in the same way as a registered FA. Furthermore, some respondents from FAs and ACs expressed concern that they would have to pay tax or other fees if they were to register with the ministry.

4.1.7 Challenges to FO operations

74. From the survey, FOs face many challenges that restrain their performance and hinder their ability to meet members' needs. Some major challenges are: shortage of credit capital, lack of adequate farm land, poor group structure, members' illiteracy, lack of external support (access to information and services), leadership problems, limited knowledge about planning, and lack of good leadership and partisanship. Qualitative findings are consistent with those of the survey, as presented in Table 7

Table 4.3: Challenges facing FOs (percentage of HH reporting, n=330)

Challenges	Facing challenges			Level of severity		
	Yes	No	DK	1	2	3
Lack of common objectives	36.06	63.03	0.91	47.06	31.09	21.85
Poor group structure	50.30	48.79	0.91	39.76	38.55	21.69
Lack of good leadership	51.82	48.18	0.00	43.86	26.90	29.24
Poor enforcement of internal regulations	61.21	38.48	0.30	50.50	32.67	16.83
Poor book keeping/ financial management	36.36	61.82	1.82	26.67	40.83	32.50
FO does not respond to members' needs	62.12	37.58	0.30	45.85	34.63	19.51
Lack of members' motivation to take part in collective action	45.15	54.85	0.00	39.60	38.93	21.48
Members' illiteracy	79.39	20.00	0.61	34.35	30.15	35.50
Lack of external support (access to information and services)	70.61	27.27	2.12	31.76	41.20	27.04
Poor communication with local authority	27.58	71.52	0.91	27.47	29.67	42.86
Jealousy among members	38.79	60.61	0.61	39.06	32.81	28.13
Limited knowledge about planning	63.94	34.85	1.21	44.55	38.86	16.59
Impractical knowledge and techniques provided by supporting agencies	68.79	30.30	0.91	35.68	42.73	21.59
Lack of farmland	79.70	20.30	0.00	30.80	22.05	47.15
Shortage of capital and credit facilities	82.73	16.67	0.61	27.84	32.97	39.19
Lack of partisanship	27.58	72.42	0.00	19.78	34.07	46.15

Note: DK: Do not know; 1= somewhat serious; 2= serious; 3= very serious

75. Lack of credit capital. Survey results show that about 83 percent of the respondents (i.e., FO member households) said that their FO did not have enough money to provide loans to members (Table 4.3). Similar observations were gleaned from the key informant interviews and the FGDs. The FO members indicated that the major reason for forming a group is to mobilise savings capital to invest in agriculture related activities; however, the capital savings could not meet the needs of its members. Thus, many FO members often get their agricultural inputs (equipment, fertiliser, seed, livestock) on loan from support agencies or traders and pay for them after harvest. Many members also access MFIs, despite the high interest rate, to invest in agricultural production, including rice, vegetables and livestock. This indicates that the poorer members in the group might be unable to access some important inputs, and despite having learned new agricultural techniques from their FOs or support agencies, do not have the means to put them into practice to improve crop productivity.

76. Illiteracy and limited knowledge of FO members. Besides the lack of credit capital facilities, a critical problem faced by FOs in the study areas is the low capacity of human resources, including limited leadership and poor book-keeping, financial management and communication skills. This makes it difficult to find educated or even literate candidates to be elected or selected as leaders and/or managers. In some groups, the leader is unable to read or write, lacks public speaking skills and has limited planning skills but was still elected due to the lack of alternative candidates; this could hinder the overall improvement of FOs' performance. Given members' limited knowledge, they find it difficult to understand the group's function and operation let alone the legal framework for FOs[13]. This is a critical issue that can easily lead to mistrust, especially over financial records, among the members or between members and the FO management committee. In addition, FOs are only as strong as the level of skills of their individual members. For example, for farming FOs, management members require skills like book keeping, leadership, communication, facilitation and agricultural technologies while the ordinary FO members require agricultural techniques and understanding group work.

77. Limited participation from FO members and poor enforcement of internal regulations. The study noted that low participation from members is a general issue faced by FOs, as depicted by the 45.2 percent claiming this problem .The KIIs and FGDs elaborate this when they said that shortcomings include sporadic attendance in the meetings and depositing money late. There are three reasons for this. First, members who are deeply in debt to the FO tend to avoid taking part in any FO activities. Second, some members are so busy working far away from the village that they do not have enough time to participate. Third, the FO leaders need to strike a balance between rule enforcement and tolerance when some members do not conform to the FO's statute and rules. Activities that require collective group effort were one of the difficulties observed in FOs in the study areas, according to some 45.2 percent (see also Table 4.3). This especially applies to work relating to agricultural

[13] Legal framework is too complex for farmers with limited knowledge to clearly understand the legal context of formal organisations

production, including animal raising and vegetable growing. These kinds of activities need some members to contribute more such as spending more time and effort in the FO's operation and management. The problems that commonly arise from working in a group mostly relate to benefits distribution, jealousy, and trust. So working in a group seems to have more problems than working individually where the benefits belong to the individual household and do not have to be shared with others.

78. Limited knowledge of agricultural techniques' adoption and marketing. Observations from the survey show that about 69 percent of members find the agricultural techniques they had been taught to be far from feasible in practice (Table 4.3). Qualitative findings also suggest that agricultural techniques are sometimes not applicable in members' areas, or are only partly adopted due to lack of inputs to follow all the technical advice, implying that the technical services do not always respond to FO members' needs. Some members said that despite following the technical guidelines, they did not get the results as demonstrated in the training; this was mainly due to great difficulty and complexity in applying the guidelines. For instance, in their livestock (cattle, pigs) and poultry raising (chickens and ducks), FO members struggle to manage pig and chicken diseases using the traditional techniques taught by their FOs or support agencies; their livestock raising almost failed completely due to the ineffective disease control methods they had learned. Key informants and FGD participants did say that the animal husbandry techniques they had learned are good enough to improve productivity if their livestock stays healthy. Regarding vegetable cultivation, given the drawbacks of disease, insect infestation, lack of capital, and lack of high land (i.e. above rainy season flood level), FO members still find it difficult to improve yields, access markets, and to get better prices because of lack of collective marketing. Although vegetables are a good value-added crop, only a few FO members and non-members grow them. This is partly due to their lack of access to higher land, and because vegetables are a high maintenance crop, need a lot of water and are susceptible to insects, pests and disease (see the empirical analysis section for details).

79. Mistrust. Trust is most important for FOs to work effectively and sustainably. But generating or earning members' trust is one of the most daunting challenges facing FOs in Cambodia and other developing countries (Pomeroy *et al.* 2001; Hansen *et al.* 2002; Pretty 2003; Ros 2010). Low human capital and poorly skilled FO management committees are the key problems creating mistrust in FOs. Mistrust in FOs mostly stems from improper financial record keeping and the limited capacity of group leaders. Nepotism and poor management also can lead to jealousy and mistrust in the FOs. Most group members highly depend on the support agencies (local NGOs) that they have been involved with and monitor all financial records. They expect the facilitators assigned by the NGOs to assist the groups whenever they face problems, and to especially monitor their groups' financial records every month. This indicates that there is space for support agencies to improve mediation and help build trust among members and between members and leaders. The survey findings suggest that the level of trust in the FOs with regard to financial management (savings, lending, financial records), i.e. less than 50 percent of the FO members responded "definitely trust" (Table 4.4) is very high. However, this survey result contradicted with the qualitative data that raised the question of trust in the FOs and it should be noted that

there are two possible reasons for the differences between qualitative and survey findings. First, farmers might have underreported because trust is an abstract and sensitive issue. Second, unlike the semi-structured interviews, the survey did not enable enumerators to probe deeply into the answers given.

Table 4.4: Level of Trust (percentage of HH reporting)

Level of trust	Level of trust				
	1	2	3	4	5
Can members in your group generally trust each other in matters of lending and borrowing money?	0.3	3.64	15.45	35.45	45.15
Do you and other members trust the committee with financial management?	0.91	2.73	11.52	38.79	46.06
Do you and other members trust your leader to manage the FO well?	0.3	3.64	11.52	38.18	46.36
Do you, members and your committee and leader trust support staff to help monitor your FO? (Book keeping, financial records…)	0.61	3.64	13.64	39.7	42.42

Note: 1=not at all; 2= somewhat trust; 3=normal; 4=trust; 5= definitely trust

80. Qualitative information from the KIIs and FGDs revealed that limited participation from FO members and improper enforcement of internal regulations are the main challenges for FO operation. Low participation from members is a general issue faced by FOs. Shortcomings include sporadic attendance at the meetings and depositing money late loan repayment. There are three reasons for this. First, members who are deeply in debt to the FO tend to avoid taking part in any FO activities. Second, some members are so busy working far away from the village that they do not have enough time to participate. Third, the FO leaders need to strike a balance between rule enforcement and tolerance when some members do not conform to the FO's statute and rules.

81. One of the difficulties observed in FOs in the study areas is collective group effort, especially work related to agricultural production including animal raising and vegetable growing. These kinds of activity need some members to contribute more than others such as the time and effort spent on the FO's operation and management. The problems that commonly arise from working in a group mostly relate to benefits distribution, jealousy and trust. So working in a group seems to generate more problems compared to working individually where the benefits belong to the individual household and do not have to be shared with others.

4.2 Empirical Findings

4.2.1 Descriptive statistics

82. The data used in the analysis were collected in a survey of 699 households in the four study provinces, which have a high density of operational farmer organisations. The data collected included information on household socioeconomic and farming characteristics such as input use, production costs, productivity (yield) and produce prices. Four households were dropped from the sample due to outliers, reducing the total to 695 households, 330 of which are FO member households. The definitions and descriptive statistics for the variables used in the empirical analysis are listed in Table 4.5.

83. Estimates show that the average age of household heads is around 48, the mean number of years of household heads' education is about 4, and 66 percent of the household heads can read and write. Male-headed households are predominant, comprising about 77 percent of the total sample households. The average household size is about five persons, with a mean dependency ratio of 0.59.

84. Approximately 72 percent of the households depend on agriculture as their primary income source, and about 65 percent had accessed credit over the 12 months prior to the survey.

85. On average, the rice yield in the study areas is about 1.89 tonnes per ha, much lower than the national average of 2.75 tonnes per ha in 2008 (Table 4.5) (Theng & Koy 2011). The revenue from rice farming in this study was about 1.7985 million riels (USD442.98) per ha, with profit of 1.1453 million riels (USD282.1) per ha[14]. The income from livestock raising is 2.3 times higher than from rice cultivation, with an average revenue of about 4.2 million riels and profit of 3.6 million riels per year; however, the variation among household revenue from livestock was very high compared to that from rice (Table 4.5). Vegetable growing is the third most important sub-sector source of household income, providing an average revenue of about 1.63 million riels per 10a and about 1.41 million riels profit per year.

[14] Refer to section 3.3 for the cost of rice production covered in this study; household labour costs are not included.

Table 4.5: Definition of variables and descriptive statistics

Variables	Description	Sample mean	Standard deviation
Outcome variables / dependent variables			
Rice yield	Mean rice output (kg per ha)	1891.77	1070.50
Rice revenue	Rice revenue (0000 riels per ha)	179.85	109.68
Rice profit	Rice profit (0000 riels per ha)	114.53	196.38
Livestock revenue	Livestock revenue (0000 riels)	419.78	589.77
Livestock profit	Livestock profit (0000 riels)	362.41	445.29
Vegetable revenue	Vegetable revenue (0000 riels per 10a)	163.94	307.11
Vegetable profit	Vegetable profit (0000 riels per 10a)	141.28	286.22
Independent/explanatory variables (control variables)			
Head of household characteristics			
Age of HHH	Age of household head	48.44	13.10
Education of HHH	Number of years of HHH attended school	3.97	3.35
Literacy of HHH	HHH can read and write(dummy)	0.66	0.47
HHH male	HHH is male (dummy)	0.77	0.42
HHH married	HHH is married (dummy)	0.82	0.38
Unemployment of HHH	HHH is unemployed (dummy)	0.34	0.47
Household characteristics			
HH size	Household size	5.11	1.96
Dependents	Dependency ratio (adults aged 15-65 years)	0.59	0.58
Agri. income source	Agriculture is primary source of HH income (dummy)	0.72	0.45
Credit access	Household access to loan in last 12 months (dummy)	0.65	0.48
Welfare characteristics			
Value of all assets	Total value of assets (0000 riels)	550.28	624.18

Note: exchange rate at time of survey was 1USD = 4060 riels; 10a is equal to 1000 m^2

86. Results of the t-test reveal some apparent differences in household characteristics, in particular education, literacy and unemployment status of the household head. There are also significant differences in access to credit, and total value of household assets. There are no statistically significant differences in the average age of household head, household size, dependency ratio, and agricultural based-household income source (see Table 4.7, and Tables A4-1 and A4-2 in Appendix 4 for details). Although members' illiteracy is perceived to be one of the main challenges facing FOs, more members can read and write than non-members. This implies that the interviewed FO members are literate, but they find that other members' illiteracy is a constraint to their FOs. However, matching members and non-members using PSM gives a more comparable sample of members and non-members of FOs. Differences in characteristics and statistics between FO members and non-members, and the results of the t-statistics are shown in Tables 4.6 and 4.7

87. The outcome productivity variables for rice, livestock and vegetables were generally higher in members' households than in non-members'. Members' revenues and profit from both rice and vegetables were likewise higher than non-members', but statistically significant differences were not found. It will be recalled that the mean education of household heads for members is significantly higher than the non-members', but this appears to be less of a factor to productivity. It is likely that household level characteristics (e.g., credit access, agricultural assets) on which FO members and non-members significantly differ could be contributing to the seemingly higher revenues and profits among members. Members' revenue from livestock is statistically significantly different, being on average about 883,200 riels (USD218) higher than non-member households' (Table 4.7, Pooled Sample)[15].

88. Further analysis by decomposing the sample member households into sub-samples, i.e. farmer group (FG), farmer association (FA) and agricultural cooperative (AC), shows different effects of participation in FOs. There are no significant differences with regards to revenues and profits from rice, livestock and vegetables for the FG member households compared with the non-members group. However, there are differences between AC member households and non-members that are significant at the 5 percent level: AC members had higher revenues and profits from both rice and livestock compared to non-members, though that from vegetables showed no statistically significant difference (Table 4.7). Statistically significant differences were also found in livestock revenue and profit between FA members and non-members.

[15] This figure represents the difference between FO members and non-members. Descriptive statistics on livestock is given in Table 4.7 below. Ninety nine percent of member and non-member households raise livestock, thus it did not make sense to compare 1 percent of the non-livestock households sampled.

Table 4.6: Differences in household characteristics of members and non-members

Variables	Description	Members	Non-members	Difference	t-Stat
Independent/ explanatory variables (control variables)					
Head of household characteristics					
Age of HHH	Age of household head	48.47	48.41	0.06	0.06
Education of HHH	Number of years of HHH schooling	4.35	3.64	0.71**	2.81
Literacy of HHH	HHH can read and write(dummy)	0.72	0.60	0.12***	3.22
HHH male	HHH is male (dummy)	0.75	0.80	-0.05	-1.54
HHH married	HHH is married (dummy)	0.82	0.82	0.00	0.07
Unemployment of HHH	HHH is unemployed (dummy)	0.29	0.39	-0.10**	-2.82
Household characteristics					
HH size	Household size (number of persons)	5.21	5.02	0.20	1.31
Dependents	Dependency ratio (to adults aged 15-65 years)	0.57	0.60	-0.03	-0.62
Agri. income source	Agriculture is primary HH income (dummy)	0.71	0.72	-0.01	-0.41
Credit access	HH access to loan in last 12 months (dummy)	0.72	0.59	0.13***	3.68
Welfare characteristics					
Value of all assets	Total value of assets (0000 riels)	598.69	506.50	92.19**	1.95
Number of households / observations		330	365	-	-

Note: *, **, *** indicate statistically significant difference at 10%, 5% and 1% level, respectively.

Table 4.7: Differences in agricultural productivity variables (sample mean)

Outcome variables / Dependent variables		Members	Non-members	Difference	t-Stat
Pooled Sample					
Rice	Revenue (0000 riels ha)	186.39	173.51	12.88	1.46
	Profit (0000 riels ha)	124.38	104.99	19.39	1.23
Livestock	Revenue (0000 riels)	465.12	376.80	88.32**	1.90
	Profit (0000 riels)	389.89	336.35	53.54	1.52
Vegetables	Revenue (0000 riels per 10a)	178.25	144.24	34.01	0.83
	Profit (0000 riels per 10a)	158.45	117.63	42.82	1.08
Farmer group (FG)					
Rice	Revenue (0000 riels per ha)	177.52	173.51	4.01	0.37
	Profit (0000 riels per ha)	106.63	104.99	1.64	0.08
Livestock	Revenue (0000 riels)	333.89	376.80	-42.90	-1.00
	Profit (0000 riels)	306.53	336.35	-29.82	-0.76
Vegetables	Revenue (0000 riels 10a)	222.60	144.24	78.37	1.35
	Profit (0000 riels 10a)	201.03	117.63	83.40	1.56
Farmer association (FA)					
Rice	Revenue (0000 riels ha)	172.24	173.51	-1.27	-0.10
	Profit (0000 riels ha)	107.66	104.99	2.67	0.10
Livestock	Revenue (0000 riels)	557.47	376.80	180.67**	2.50
	Profit (0000 riels)	432.70	336.35	96.35*	1.78
Vegetables	Revenue (0000 riels per 10a)	131.02	144.24	-13.22	-0.25
	Profit (0000 riels per 10a)	117.12	117.63	-0.51	-0.01
Agricultural cooperative (AC)					
Rice	Revenue (0000 riels per ha)	219.27	173.51	45.76***	3.38
	Profit (0000 riels per ha)	176.14	104.99	71.15**	2.67
Livestock	Revenue (0000 riels)	589.75	376.80	212.95**	3.19
	Profit (0000 riels)	490.57	336.35	154.22**	2.70
Vegetables	Revenue (0000 riels per10a)	162.90	144.24	18.66	0.35
	Profit (0000 riels per10a)	140.09	117.63	22.47	0.47

Note: *, **, *** indicate statistically significant difference at 10%, 5% and 1% level, respectively; 10a is equal to 1000 $m^{2.}$

89. Agricultural land is the most valuable asset for agricultural productivity and livelihoods in rural areas. However, not all households surveyed have this asset. Table 4.8 shows that 17 member (about 5 percent) and 35 non-member households (about 9.5 percent) reported having no agricultural land. On average, members' size of agricultural land holdings (1.93 ha) is similar to non-members' (1.81 ha)[16]. There are also no significant differences between the members and non-members group in terms of the number of farming plots they own (Table 4.8). The distribution of land-size categories owned by members and non-members also shows a similar pattern: about 37.5 percent of households (in both groups) hold less than 1 ha, about 26 percent hold 1-2 ha, around 11 percent have 2-3 ha and 18 percent have more than 3 ha (Table A4-3 in Appendix 4).

90. Members' land holding by different types of FO compared with non-members shows that FO members seem to have larger land holdings than non-members with the exception of FG members who have smaller land holdings than non-members, but there are no statistically significant differences. That members and non-members have similar sizes of agricultural land holdings is reflected consistently with no significant difference for crop productivity in the pooled sample, as discussed above (Tables 4.7 and 4.8). This implies that the higher statistical significance in rice productivity (revenue and profit) of AC members compared to that of non-members may be due to factors other than size of land holding, for example better access to technology and/or better management of inputs application.

[16] The sample mean of land holding is calculated by excluding landless households. The average farm size presented in Table 4.2 is calculated based on all sample households, including landless households, for matching purposes.

Table 4.8: Agricultural land [17]holding by households in member and non-member groups

Type of land	Members			Non-members			t-statistic
	n	Mean	Median	n	Mean	Median	
Landless	17			35			
Agricultural land holding	313	-	-	330	-	-	-
Average no. of plots per HH	313	3.19	3.00	330	3.15	3.00	0.29
Agricultural land (pooled sample)	313	1.93	1.16	330	1.81	1.07	0.71
Agricultural land (FG vs. non-members)	138	1.67	1.00	330	1.81	1.07	-0.65
Agricultural land (FA vs. non-members)	98	2.06	1.30	330	1.81	1.07	1.03
Agricultural land (AC vs. non-members)	77	2.23	1.50	330	1.81	1.07	1.53

Note: *, **, *** indicate statistically significant difference at 10%, 5% and 1% level, respectively.

91. Comparisons of the mean differences in outcome variables, rice and livestock revenue and profit, and other household characteristics between FO members and non-members show that FO members are seemingly better-off than non-members (Tables 4.6 and 4.7). However, these comparisons of mean differences do not account for the effects of other characteristics of the sample households, and thus may confound the results for the impact of participation in FO (i.e. FO members). Caliendo and Kopeinig (2008) suggest that to obtain a clear picture of the effect of participation on outcomes, systematic differences between covariates (observable variables) of members and non-members should be eliminated, which is done by matching member and non-member households using propensity score matching (PSM). The variables included in the model would only be those that influence both members and outcomes, but are not affected by participation in FOs when matching is performed. Furthermore, the choice of variables should be guided by economic theory, sound knowledge of previous research and the institutional setting in which treatment (FO members) and outcomes are measured (Smith & Todd

[17] We tried including agricultural land area in the specification model of participation in FO, but we subsequently excluded the insignificant variables, including agricultural land from the model.

2005). The variables used in our propensity score model in this study are based on previous research on the determinants of participation in rural producer organisations. Literature shows that participation in a producer organisation (i.e. FOs) depends to a large extent on household head characteristics, household resource endowments, and household location characteristics (Bernard & Spielman 2009; Miyata *et al.* 2009; Davis *et al.* 2010; Bachke 2010). The following section discusses the analysis of participation and outcome variables by PSM.

4.2.2 Analysis of participation characteristics in FO

92. Age of household head has a positive impact on household participation in FOs. This finding tends to contrast with recent studies of Bachke (2010) and Davis *et al.* (2010) in which age is a negative determinant of a household's decision to participate in a FO. The results indicate a positive relationship between a household head's age and propensity to participate in FOs; however, when household heads become older they are less likely to join a FO[18]. Taking the sub-samples (i.e., FG, FA, AC) into account, findings reveal that age of household head has a significant effect similar to the pooled sample, except for the FG member sub-sample in which age of household head has no significant effect on participation (see Table 4.10). Table 4.9 illustrates the results of logit estimation from equation (1) for the FO participation determinant.

93. Male household heads have lower propensity to participate in FOs than their female counterparts. This finding implies that FOs in Cambodia may have primarily targeted vulnerable female household heads so that they can enhance their capacity in community activities. Female household heads are frequently concerned with household matters and are thus likely to get involved with FOs in their village, where they believe doing so would provide them with various kinds of support. Male household heads may tend to focus more attention on farm production and seek other off-farm activities. When considering the sub-sample, this significant effect is only observed for the FA.

94. Unemployment of household head is negatively associated with a household's participation at least 5 percent significant level in the pooled sample and FG and FA sub-samples. However, it has no significant impact on the participation in AC, and it is in line with Bachke's (2010) findings (Tables 4.9 and 4.10). A possible explanation of the negative relationship between an unemployed household head and probability of participating in a FO is that unemployed household heads may be older[19] and less active in seeking jobs outside their primary farming and engaging in community-based-work. This determinant is consistent with the result for age of household head; older household heads are less likely to join a FO.

[18] The U-shape marginal effect of age is 54 years old, i.e. household heads older than 54 are unlikely to participate in FOs

[19] Average age of unemployed household head is about 56

Table 4.9: Propensity score estimation for FO participation

(Logit estimation for pooled samples)[20]

Explanatory Variables	Pooled 1	Pooled 2 (no credit)
Age of household head	0.134***	0.133***
Age of household head squared	-0.0012**	-0.00127**
Number of years of household head's schooling	0.0347	0.033
HHH can read and write(dummy)	0.381	0.369
HHH is male (dummy)	-1.025***	-1.033**
HHH is married (dummy)	0.574	0.6023
HHH is unemployed (dummy)	-0.606***	-0.592***
Household size	-0.440**	-0.370**
Square of Household size	0.0358**	0.0323**
Dependents ratio (adults aged 15-65 years)	0.244	0.2176
Agriculture is primary source of HH income (dummy)	0.0526	0.0615
Household access to loan in last 12 months	0.688***	
Index of household agricultural assets	0.182*	0.2049**
Total value of assets (0000 riel)	0.00087***	0.00074**
Square of asset value	-3.26×10^{-7}***	-3.23×10^{-7}**
Constant	-3.107**	-2.684**
Pseudo R^2	**0.0734**	**0.0575**
Number of observations	**695**	**695**

Note: Coefficient is reported. * statistically significant at 10%, ** significant at 5% and *** significant at 1%.

[20] When credit variable is excluded, there is no sign of changes in coefficient of other variables in the logit estimate, the model is more stable. Therefore, discussion of credit variable is included in our report.

Table 4.10: Propensity score estimation for FO participation

Explanatory Variables	AC 1	AC 2 (no credit)	FA 1	FA 2 (no credit)	FG1	FG 2 (no credit)
Age of household head	0.294***	0.281***	0.1874**	0.188**	0.052	0.052
Age of household head squared	-0.0026***	-0.00255**	-0.00178**	-0.0018**	0.0005	0.0004
Number of years of household head's schooling	0.1095*	0.1051*	0.0661	0.0584	-0.027	-0.020
HHH can read and write(dummy)	0.636	0.614	0.260	0.241	0.528*	0.467
HHH is male (dummy)	-0.644	-0.709	-1.693***	-1.669***	-0.653	-0.664
HHH is married (dummy)	-0.294	-0.235	1.455***	1.479***	0.357	0.360
HHH is unemployed (dummy)	-0.132	-0.151	-0.598**	-0.591**	-0.842***	-0.815***
Household size	-0.571*	-.510*	-0.531**	-0.426*	-0.309	-0.239
Square of Household size	0.034	0.0310	0.049**	0.0424**	0.026	0.023
Dependents ratio (adults aged 15-65 years)	0.334	0.318	0.128	0.117	0.217	0.208
Agriculture is primary source of HH income (dummy)	-0.119	-0.0783	0.2621	0.295	-0.066	-0.048
Household access to loan in last 12 months	0.531*		0.742***		0.782***	
Index of household agricultural assets	0.182	0.215	0.172	0.186	0.162	0.210
Total value of assets (0000 riel)	0.00265***	0.00256***	0.000289	0.000199	0.001	0.000
Square of asset value	-8.48×10^{-7}***	-8.41×10^{-7}***	-1.15×10^{-7}	-1.28×10^{-7}	0.000	0.000
Constant	-8.965***	-8.449***	-5.602***	-5.354***	-2.071	-1.594
Pseudo R^2	**0.1653**	**0.1572**	**0.1001**	**0.0844**	**0.0608**	**0.0419**
Number of observations	**445**	**445**	**470**	**470**	**510**	**510**

Note: Coefficient is reported. * statistically significant at 10%, ** significant at 5% and *** significant at 1%.

95. Household size is negatively related to a household's participation in FO for the sub-samples and pooled sample. This result is backed by Davis *et al.* (2010), but contradicts Bachke (2010). One possible reason is that a household could deploy some of its members to earn income through various means such as migration thus preventing the household from participating in a FO. However, when household size increases to its maximum[21], its link with propensity to participate in FOs turns positive, except for AC which has no positive significant impact. A possible explanation is that when household size becomes larger, it is likely to divert its members to FO participation, i.e. FG or FA. This suggests that a FO (FG or FA) member's household is likely to have greater labour power (to deal with the collective work of FOs) while an AC member's household is likely to be smaller in comparison.

96. Household access to loan shows a positive significant relationship with propensity to participate in FOs (pooled and sub-samples), implying that a household participating in FO has more access to credit. Survey data after matching shows that more than half of FO members get loans from their FOs though there are no significant differences in interest rate and amount of loans between members and non-members. This observation is similar to that of Couturier *et al.* (2006) and Chea (2010), where savings and credit is reported as a key activity of many FO types in Cambodia. The same is true for this study with approximately 67 percent of FO members stating savings and credit to be their main activity. However, FGD participants and key informants expressed that the amount of loan provided does not meet their needs, though they acknowledged that FO loans do not impose complex requirements and offer a more flexible repayment terms, because the average loan size a member has received from FO is 340,000 Riels during the study period. However, credit access is an endogenous variable, determined by an instrumental variable, which this study is not able to address. Hence, it does enable us to imply causal relationship between access to credit and participation in FO.

97. The index[22] of household agricultural assets has a positive relationship with a household's decision to participate in a FO but is statistically significant at 10 percent level, implying that a household with productive agricultural assets is likely to participate in a FO. However, when the sub-samples are taken into account, this variable has a positive impact on participation, though not significant. One possible explanation is that agricultural assets may be a complementary factor, allowing a household to make use of agricultural techniques from its FO (Bernard & Spielman 2009). In contrast, a household with limited productive assets may find it difficult to apply the techniques acquired from a FO, and thus have low propensity for participation.

98. Generally, household head's education shows positive probability to join FOs, but is not statistically significant (Tables 4.9 and 4.10). This implies that there is

[21] U-shaped marginal effect of household size is six persons

[22] It is estimated by principal component analysis in STATA involving number of agricultural tools and equipments. The index basically is not interpreted, but can show casual relationship with participation in dependent variable (FO) when we incorporate it into the model specification.

no relationship between the education of the household head (i.e. human capital) and participation in FOs. This empirical result is consistent with the qualitative findings that those with both lower and higher human capital can participate in FOs. As for household welfare, the associated probability between this variable and participation in FOs is U-shaped, even though there is a positive and statistically significant probability between total value of assets and participation in FOs. The marginal effect shows that when the total value of assets is higher than 13.6 million riels (USD3350), households are less likely to participate in a FO. These indicate that the probability of participating in FOs is likely to decrease as farmers reach higher levels of productive capital; however, farmers with both lower and higher levels of human capital participate in FOs. This is probably because members or leaders who have some knowledge are needed to lead and manage the complex FO functions and operations and/or to respond to legal framework issues in order to sustain the operation of FOs.

99. In sum, there are indications that hypothesis 1a, that "farmers with higher levels of human capital are less likely to participate in FOs, while poor farmers with lower levels of human and productive capital are more likely to do so" does not hold. As shown above, the number of years spent at school has no significant relationship with the propensity to participate in FOs.

4.2.3 Impact of FO participation on livelihoods

100. This section presents the results of the average treatment effect of participation in FOs on rice crop and livestock productivity using both NN Matching and Kernel Matching approaches. Caliendo and Kopeinig (2008) point out that there is no best algorithm for matching, because the selection of algorithm for matching completely depends on the data at hand. In addition, the reason for using PSM is to reduce characteristic gap between members and non-members rather than to obtain precise estimates from different algorithm matching estimators. In this regard, our interpretation is based on Kernel matching though we present two different algorithm results – nearest neighbour (NN) matching and kernel matching estimators. Moreover, to get a deeper understanding of the effect of FO participation on rice and livestock productivity, the pooled sample and sub-samples (i.e. FG, FA and AC) were examined to determine which types of FOs significantly impact on members' livelihoods. We have also reinforced the results from PSM by using those from Ordinary Least Square (OLS) approach.

101. Table 4.11 shows the matching results of the effect of participation in FOs on rice productivity and profit. In the pooled sample, though FO members have higher revenue and profit than non-members, FO participation (i.e., for FO members) does not exert any significant effect on the value (revenue) and profit of rice production. However, at sub-sample level, the effect of participation in an AC (i.e., for AC members) has a positive and significant impact on rice productivity and profit. AC members' average rice revenue is about 376,400 riels (USD92.70) higher per ha and rice profit is approximately 629,700 riels (USD155.10) higher per ha than the non-members', implying that AC member households have better technology and are

more cost-efficient than non-member households. This finding coincides with the studies of Bratton (1986), Bachke (2010) and Davis *et al.* (2010).

Table 4.11: Average treatment effects of PSM for rice crop[23]

Variable	Nearest neighbor matching			Kernel matching		
	Difference (ATT)	T-stat	treatment/ Control (Number)	Difference (ATT)	T-stat	treatment/ Control (Number)
Rice revenue /ha (0000 riels)						
Pooled sample	13.82	1.37	292/313	10.40	1.13	301/313
- Farmer group	0.24	0.02	129/313	2.03	0.17	134/313
-Farmer association	19.49	1.28	87/313	-2.68	-0.2	92/313
-Agri. cooperative	19.05	0.95	74/313	37.64	2.46**	73/313
Rice profit /ha (0000 riels)						
Pooled sample	21.65	1.13	292/313	14.06	0.82	301/313
- Farmer group	-7.50	-0.58	129/313	-4.29	-0.22	134/313
-Farmer association	7.08	0.3	87/313	1.13	0.05	92/313
-Agri. cooperative	32.41	1.73*	74/313	62.97	3.17***	73/313

Note: *,**,*** indicate statistically significant difference at 10%, 5% and 1% level respectively; ATT refers to the average treatment effect on the treated.

[23] These results are confirmed by Ordinary Least Square (OLS) regression results in Tables A6-2 and A6-3. Also, we find that households with irrigated farm land have higher revenue per Ha than those without irrigated land.

102. The effect of AC membership on rice productivity and profit finds support in the observation that FO members have statistically significant greater access to technical services than non-members. About 55-70 percent of FO members had accessed training services such as improved seed selection, disease and pest control, chemical fertiliser application, composting and planting techniques for rice, compared to only 30 percent of non-members (Table 4.12). Another possible reason for the significant effects of AC membership is that among the three types of FO, AC members have significantly larger loans (2.51 million riels) than non-members (1.37 million riels) at comparable interest rates (3.24 percent vs. 3.55 percent) (Table 4.13). Also, FO members' (all types of FO) and non-members' main motive for taking out a loan is to invest in agriculture (rice and vegetable production) (Table A4-4 in Appendix 4). At the same time, AC members use lower amounts of inputs such as chemical fertilisers and pesticides than non-members, though there is no significant difference, indicating AC members' better management and know-how i.e., applying the right amount of inputs at the right time significantly contributes to improved rice productivity and reduced input costs (Table 4.14). Our PSM results are consistent with OLS regression results, which show that only AC has positive and significant impact on rice productivity and profit. OLS results provide an appealing finding that irrigation has a positive impact on rice productivity because the irrigation coefficient is positive and statistically significant at 10% for pooled sample and 5% for every subsample (Table A6-2). The index for agricultural assets also demonstrates a positive and significant effect on rice productivity, which coincides with an empirical study in rural Cambodia (Tong, 2011).

Table 4.12: Pre- and post-production services access by members and non-members (percentage of HHs reporting)

Services /advice	Members		Non-members		Chi^2-Test	P-Value
	n	%	n	%		
Rice/vegetables						
- Disease and pest control for crops	221	66.97	120	32.88	80.61	0.000
- Planting techniques	243	73.64	145	39.73	80.81	0.000
- Improved crop varieties and seed selection	236	71.52	143	39.18	73.09	0.000
- Chemical fertiliser application	186	56.36	98	26.85	62.47	0.000
- Composting and organic residue management	234	70.91	109	29.86	116.81	0.000
- Irrigation and water management for crops	176	53.33	94	25.75	55.49	0.000
Livestock raising techniques						
- Breed improvement	212	64.24	112	30.68	78.42	0.000
- Housing	232	70.3	124	33.97	91.56	0.000
- Disease control	215	65.15	101	27.67	98.19	0.000
- Feeding and nutrition	207	62.73	95	26.03	95.00	0.000
Market Information						
- Output prices	195	59.09	137	37.53	32.28	0.000
- Input prices	156	47.27	103	28.22	26.91	0.000
- Collective marketing	111	33.64	34	9.32	62.09	0.000
- Where to sell products	167	50.61	99	27.12	40.45	0.000

Table 4.13: Credit access by members and non-members during the past 12 months

	Members	n	Non-members	n	t-statistics
Pooled sample					
Number of HHs with loan	-	238	-	215	-
Number of HHs without loan	-	92	-	150	-
Average number of loans per HH	1.59	238	1.27	215	4.55***
Average size of loan (0000 riels)	201.04	238	137.19	215	2.49**
Average monthly interest rate (%)	3.31	222	3.55	172	-1.32
Age of loan to total number of loans (months)	9.53	238	8.77	215	0.71
Sub-sample					
Average loan size: FG vs. non-member (0000) riels)	182.24	109	137.19	215	1.44
Average interest rate: FG vs. non-member	3.25	99	3.55	172	-1.37
Average loan size: FA vs. non-member (0000 riels)	194.94	78	137.19	215	1.98**
Average interest rate: FA vs. non-member	3.44	74	3.55	172	-0.44
Average loan size: AC vs. non-member (0000 riels)	250.56	51	137.19	215	2.99***
Average interest rate: AC vs. non-member	3.24	49	3.55	172	1.13
Among FO members					
Average loan size: FG vs. FA (0000 riels)	182.24	109	194.94	78	-0.28
Average loan size: FG vs. AC ('0000 riels)	182.24	109	250.56	51	-1.15

Note: *, **, *** indicate statistically significant difference at 10%, 5% and 1% level, respectively.

Table 4.11: Technology use and output price between AC members and non-members

AC	Treatment	Control	Difference	t-Stat
Technology adopted				
Fertiliser used for rice (kg per ha)	116.01	188.19	-72.18	-0.58
Pesticides used for rice (kg per ha)	1.28	1.66	-0.38	-0.97
Average price of fertiliser (riels per kg)	1378.69	1668.99	-290.30	-0.73
Average price of pesticide (riels per kg)	29553.03	18974.26	10578.77**	2.41
Average price of rice (riels per kg)	968.62	948.31	20.31	1.00
Total input cost				
Total rice input cost (0000 riels per ha)	43.13	68.52	-25.38	-1.03
Total livestock input cost (0000 riels per HH)	99.17	40.45	58.72**	2.42

Note: *, **, *** indicate statistically significant difference at 10%, 5% and 1% level, respectively.

103. Table 4.15 illustrates the effects of FO participation on livestock revenue and profit per household. The estimate from Kernel Matching indicates that participation in FOs exerts a positive and statistically significant effect on revenue, but not on profit, for livestock in the pooled sample. On average, FO members' revenue from livestock production is about 905,500 riels (USD223) per year higher than non-members', and this is statistically significant at 10 percent level. As far as the sub-samples are concerned, there is a positive statistically significant impact on FA and AC members', but not on FG members', revenue and profit from livestock production. The difference in livestock revenues between FA and AC members' and non-members' is 2,074,100 riels (USD510.86) and 1,456,500 riels (USD358.74), respectively, being significant at 10 percent level only. In addition, OLS regression results also show positive relationship between participation in FOs and livestock production though not statistically significant (Tables A6-4 and A6-5). These effects have two possible explanations.

1) FO members tend to have broader access to livestock raising techniques. The household survey findings reveal that around 65 percent of households had access to livestock raising techniques compared to approximately 30 percent of non-members (Table 4.12). The survey also found that FO members received technical support from agencies such as the PDA and NGOs. Non-members' major sources of knowledge on livestock raising techniques are their neighbours, NGOs and self-study, suggesting that most of them have lower access to livestock husbandry techniques than members (Table A4-5 in Appendix 4). This implies that non-members have fewer incentives in terms of improving their livestock raising practices.

2) The costs of livestock production for FO members are partly covered by support agencies. For instance, key informants and FGD participants observed that some FO members had received "in-kind" assistance (i.e., chicks or ducklings) from their support agencies, thus having more incentives to raise livestock than non-members.

Table 4.15: Average treatment effects of PSM for livestock

Variable	Nearest neighbour matching			Kernel matching		
	Difference (ATT)	T-stat	treatment/ Control (Number)	Difference (ATT)	T-stat	treatment/ Control (Number)
Livestock revenue						
Pooled sample	47.18	0.89	278/297	90.55	1.80*	290/297
- Farmer group	-68.22	-1.53	122/297	-20.81	-0.54	128/297
- Farmer association	232.67	1.91**	87/297	207.41	1.84*	90/297
- Agri. cooperative	-8.12	-0.08	69/297	145.65	1.69*	69/297
Livestock profit						
Pooled sample	11.40	0.28	278/297	55.58	1.47	290/297
- Farmer group	-52.89	-1.25	121/297	-9.04	-0.25	128/297
- Farmer association	134.99	1.69*	87/297	121.10	1.73*	90/297
- Agri. cooperative	-95.79	-1.15	69/297	101.31	1.68*	69/297

Note: *, **, *** indicate statistically significant difference at 10%, 5% and 1% level, respectively; ATT refers to average treatment effect on the treated.

Table 4.16: Inputs and outputs prices (pooled sample mean)

Input and output prices	Members	Non-members	Difference	t-Stat
Technology adopted				
Fertilisers used for rice (kg per ha)	135.45	188.19	-52.74	-0.88
Pesticides used for rice (kg per ha)	1.70	1.66	0.04	0.16
Average price of fertiliser (riels per kg)	1478.89	1668.99	-190.10	-0.95
Average price of pesticide (riels per kg)	26141.23	18974.26	7166.97**	2.51
Average price of rice (riels per kg)	941.62	948.31	-6.70	-0.53
Total Input Cost				
Total rice input cost (0000 riels per ha)	62.01	68.52	-6.51	-0.46
Total livestock input cost (0000 riels per HH)	75.23	40.45	34.78	1.40

Note: *, **, *** indicate statistically significant difference at 10%, 5% and 1% level, respectively.

104. As can be seen from the discussion above, participation in FOs has limited impact on both rice and livestock productivity. Bratton (1986), Bingen *et al.* (2003), and Chirwa *et al.* (2005) all point out that for participation in rural producer organisations to have a significant impact on rural smallholder producers, FOs must fundamentally provide a combination of three services to their members: advice, input access, and market access. In Cambodia, however, FOs fail to offer a complete package of these basic services; majority of FO members receive only advice or training from their support agencies (NGOs and DAE or MAFF). In terms of access to inputs, 76 percent of FO members reported this to be occurring at the individual level (Table 4.17, Table A4-6 in Appendix 4). Absence of market support was reported by around 81 percent of members for their agriculture produce (Table 4.17, Table A4-7 in Appendix 4). Individual access to inputs increases transaction costs, while individual marketing of agricultural products risks lower bargaining power and lower prices or leads to exploitation by external buyers (Nou 2006; Couturier *et al.* 2006; Sivramkrishna & Jyotishi 2008). These indicate that FOs in Cambodia have yet to mature and explains the limited impact on their members.

105. These results suggest that the significant impacts of FO participation on rice and livestock revenues and profits, i.e. rice and livestock production for AC members' households and livestock for pooled sample and sub-samples of FA and AC, largely stem from better technology use – in effect, members have so far not benefited from low input costs or better market prices for produce through participation in FOs. Thus, if agricultural productivity and food security is to be attained, greater effort and increased attention from the government, NGOs and support agencies should strengthen FOs by prioritising other principal aims i.e., building capacity of farmers for inputs and market accessibility (Chirwa *et al.* 2005). The private sector could play an important role in helping FOs gain access to inputs supply and markets through contract farming schemes. For the latter, the government has a very important role of providing an enabling environment such as enforcement of contract farming scheme, agribusiness environment, and protection of property rights and legal rights of producer groups and contractors/ private sector. The impact of rural producer organisations on market access and their potential to significantly improve agricultural productivity and food security in developing countries is comprehensively discussed in the literature (Bingen *et al.* 2003; Chirwa *et al.* 2005; Barham *et al.* 2008; Miyata *et al.* 2009; Bernard *et al.* 2009; Markelova *et al.* 2009; Barham & Chitemi 2009; Kruijessen *et al.* 2009).

Table 4.17: Sources of access to farming inputs and selling produce market (% of HHs)

Sources of supporters	Access to farming inputs				Selling produce			
	Members		Non-members		Members		Non-members	
	n	%	n	%	n	%	n	%
Neighbours	65	20.90	104	31.42	31	9.54	35	10.17
Local authorities	28	9.00	18	5.44	0	0.00	3	0.87
Supporting agencies	46	14.79	2	0.60	9	2.77	1	0.29
Relatives and friends	15	4.82	15	4.53	3	0.92	5	1.45
Group members of FO	22	7.07	1	0.30	8	2.46	1	0.29
Traders	72	23.15	75	22.66	164	50.46	143	41.57
PDA	34	10.93	21	6.34	0	0.00	1	0.29
Self-buying/access	238	**76.53**	273	82.48	264	**81.23**	265	77.03
Other NGOs	31	9.97	21	6.34	11	3.38	2	0.58
Total (n)	553	177.81	531	160.42	490	150.77	456	132.85

106. It can be said that the effect of participation in FOs (except FGs) on agricultural productivity is positive and statistically significant for livestock production revenue only. The impact of FOs (excluding ACs) on rice productivity is not significant in the overall sample. In the sub-sample analysis, the effect exerted by AC participation is positive and statistically significant for both rice and livestock revenues and profits. Therefore, membership in FOs has a positive and statistically significant impact on both rice productivity and livestock production, but this only holds for ACs. These suggest that hypotheses 2a, 2b and 2c can be rejected, and only hypothesis 2d can be accepted.

107. To ensure that the effect of participation in FOs on agricultural productivity is not influenced by other factors, the matching quality must be checked. The ability of PSM to balance the estimates is ascertained by first considering the reduction in the mean absolute standardised biases between the matched and unmatched models. The median absolute standardised biases for rice and livestock productivity matching are in Tables 4.18 and 4.19, respectively. As shown, the standardised differences before matching range from 6.8 to 13.9 percent for rice and 4.6 to 16.3 percent for livestock, while the standardised differences after matching range from 3.1 to 8.7 percent for rice and 3.6 to 13.1 for livestock. This indicates that matching and balancing the covariates of members and non-members identified and reduced bias.

108. The kernel distribution of propensity score before and after matching in Figure A4-1 depicts a good match between members and non-members after matching. The pseudo-R^2 of the propensity score estimation before and after matching, and the livelihood-ratio test of the joint significance of covariates (i.e. all regressors) in the probit model of propensity score estimation before and after matching are the second and third indicators for checking quality matching. The P-value of the livelihood ratio test of the regressors on treatment status could always be rejected after matching (i.e. no significant differences); it is, however, never rejected before matching (i.e. significant difference) (Caliendo & Kopeinig 2008). The relatively low pseudo-R^2 and the non-significant difference in P-value of livelihood ratio test of the covariates after matching imply that there is no systematic difference in the distribution of covariates between members and non-members after matching. This suggests that the positive relationship between participation in FOs and rice and livestock productivity discussed earlier is not confounded by the impacts of other factors (see Tables A4-8 and A4-9 in Appendix 4 for outcome variables before and after matching).

Table 4.18: Indicators of covariate balancing before and after matching for rice

Matching algorithm	Outcome variables	Median absolute bias (before matching)	Median absolute bias (after matching)	Pseudo R2 (unmatched)	Pseudo R2 (matched)	P-value of LR (unmatched)	P-value of LR (matched)
Nearest neighbour matching	**Rice value (ha)**						
	Pooled sample	6.80	3.12	0.089	0.014	0.000	0.993
	FG	10.52	3.83	0.111	0.029	0.000	0.997
	FA	12.43	8.66	0.142	0.048	0.000	0.995
	AC	13.93	7.42	0.236	0.092	0.000	0.835
	Rice profit (ha)						
	Pooled sample	6.80	3.12	0.089	0.014	0.000	0.993
	FG	10.52	3.83	0.111	0.029	0.000	0.997
	FA	12.43	8.66	0.142	0.048	0.000	0.995
	AC	13.93	7.48	0.236	*0.090*	0.000	0.855
	Rice revenue (ha)						
	Pooled sample	6.80	3.82	0.089	0.023	0.000	0.840
	FG	10.52	1.83	0.111	0.019	0.000	1.000
	FA	12.43	7.16	0.142	0.037	0.000	0.999
	AC	13.93	4.63	0.236	0.062	0.000	0.986
Kernel matching	**Rice profit (ha)**						
	Pooled sample	6.80	3.34	0.089	0.016	0.000	0.981
	FG	10.52	1.83	0.111	0.019	0.000	1.000
	FA	12.43	7.16	0.142	0.037	0.000	0.999
	AC	13.93	4.63	0.236	0.062	0.000	0.986

Table 4.19: Indicators of covariate balancing before and after matching for livestock

Matching algorithm	Outcome variables	Median absolute bias (before matching)	Median absolute bias (after matching)	Pseudo R2 (unmatched)	Pseudo R2 (matched)	P-value of LR (unmatched)	P-value of LR (matched)
Nearest neighbour matching	**Livestock revenue**						
	Pooled sample	4.59	4.93	0.084	0.017	0.000	0.985
	FG	6.78	3.59	0.107	0.027	0.001	0.999
	FA	10.34	4.81	0.130	0.048	0.001	0.996
	AC	16.28	6.78	0.232	0.056	0.000	0.997
	Livestock profit						
	Pooled sample	4.59	4.93	0.084	0.017	0.000	0.985
	FG	6.78	3.59	0.107	0.027	0.001	0.999
	FA	10.34	4.81	0.130	0.048	0.001	0.996
	AC	16.28	6.78	0.232	0.056	0.000	0.997
Kernel matching	**Livestock revenue**						
	Pooled sample	4.59	3.70	0.084	0.042	0.000	0.144
	FG	6.78	3.50	0.107	0.054	0.001	0.850
	FA	10.34	7.48	0.130	0.083	0.001	0.772
	AC	16.28	12.72	0.232	0.170	0.000	0.164
	Livestock profit						
	Pooled sample	4.59	3.87	0.084	0.038	0.000	0.260
	FG	6.78	3.50	0.107	0.054	0.001	0.850
	FA	10.34	8.63	0.130	0.105	0.001	0.473
	AC	16.28	13.18	0.232	0.183	0.000	0.101

109. To see whether AC and FA members have higher agricultural productivity compared to their FG counterparts, t-test was applied to examine the revenue and profit of rice per ha and livestock per household between AC and FG members and between FA and FG members (Table 4.20). The sample means of rice and livestock productivity were tested using weighted samples after balancing the covariates of members and non-members using PSM; hence the mean significant difference is not influenced by other characteristics.

110. Results reveal that FA and FG members have comparable rice productivity because there are no statistical differences in revenue and productivity of rice per ha between both groups. However, AC members had higher rice productivity and profit than FG members, and this is statistically significant at 5 and 1 percent level, respectively (Table 4.20). The household survey observations also show that the proportion of AC members with access to rice growing techniques is higher than for FG members at 5 percent statistical significance level (data not shown). Also, though not statistically significant, AC members have access to bigger loans for investment in production inputs such as fertilisers, which help increase their rice productivity (see Table 4.13).

Table 4.20: Comparison of impacts on rice and livestock revenues and profits

Outcomes	Difference	t-Statistic
Rice revenue (0000 riels per ha)		
FG vs. FA	4.98	0.32
FG vs. AC	-41.97	-2.50**
Rice profit (0000 riels per ha)		
FG vs. FA	-1.22	-0.05
FG vs. AC	-69.95	-3.41***
Livestock revenue (0000 riels per year)		
FG vs. FA	-255.08	-2.64**
FG vs. AC	-234.10	-3.29***
Livestock profit (0000 riels per year)		
FG vs. FA	-145.06	-2.33**
FG vs. AC	-164.52	-2.95***

Note: *,**,*** indicate statistically significant difference at 10%, 5% and 1% level respectively

111. Results on livestock production show that FA and AC members perform better than their FG counterparts. The revenue and profit of FA and AC members are higher than FG members' at 5 percent and 1 percent statistical significance levels, respectively (see Table 4.20). The household survey findings reveal that FG, FA and AC members have equal access to livestock raising techniques; however, the proportion of AC and FA members who reported having easy access to quality animal vaccinations are higher than for FG members' at 1 percent and 5 percent significance levels, respectively. Thus, this tends to be a contributor to AC and FA members' relatively high revenue and profit from livestock compared to members'. Findings from rice and livestock productivity are consistent with the qualitative findings and the principles of FG formation. Most FG members are very poorly resourced since NGOs target poor households to form FGs to enhance self-help in the community; they have limited access to credit as their FGs have limited deposits/savings, and they use low level agricultural technology due to their limited ability and knowledge to use more advanced techniques[24]. The challenges facing poor-self-help groups in Cambodia are similar to those identified in other developing countries (Thorp *et al.* 2005; Bingen *et al.* 2003).

112. The results indicate that AC members' rice productivity (revenue and profit) is significantly higher than FG members', while that of FA and FG members is comparable. Additionally, AC and FA members' revenue and profit from livestock are significantly larger than FG members'. This finding allows us to reject hypothesis 3a, that "the revenue and profit of rice and livestock of FA members is likely better than that of FG members". However, we can accept hypothesis 3b, i.e. AC members' revenue and profit from rice and livestock production is higher than that of FG members.

113. Taking the institutional set-up of AC, on the other hand, we would not be able to point out that AC is the most successful type of FOs. According to our key informant interview with the supporting agency representatives (NGOs and provincial department of agriculture) as shown in the qualitative findings, some ACs are normally the former well-functioning farmer groups or farmer associations.

[24] About 69 percent of FO members reported that techniques and knowledge provided by supporting agencies are far from practical, and 83 percent reported a shortage of capital to run credit services for their members to low savings

5. Conclusions and Policy Implications

114. This study offers crucial insights into and important evidence on the impact of participation in farmer organisations on food security among rural poor households in Cambodia. Using a mixed-methods approach, the study assessed the impact of different types of FOs i.e. farmer group (FG), farmer association (FA) and agricultural cooperative (AC) on members' livelihoods in the four provinces of Battambang, Kampong Thom, Kampot and Svay Rieng, which have a high density of operating FOs. Qualitative data captured the roles, operations and the challenges facing FOs, while quantitative information, through propensity score matching (PSM), assessed a naïve (unconfounded) impact of FO participation on food security, with agricultural productivity (value of production and profit) of rice and livestock as proxies. The overall objective of the study is to provide pragmatic evidence that could assist policy makers, donors and practitioners on whether and if so, how to better support FOs' operation for livelihood improvement and poverty reduction in Cambodia.

115. The main findings from both qualitative and survey reveal that the main activity of FOs (all types of FO in the study areas) is saving and mobilising savings resources by lending to members for investment in agricultural production. Improved agricultural techniques were provided to members from support agencies via their respective FOs; in some areas, in-kind input support for crops and livestock had been extended by support agencies. Market access for agricultural produce was also facilitated by FOs, but only to a limited extent. Collective action to support access to inputs and markets was generally non-existent given that the majority of FO members purchase inputs and sell produce on an individual basis.

116. Different support agencies establish FOs in different ways but share the common principles of volunteerism and respect for FOs' rules and regulations. Most of the studied FOs were formed by external support agencies, and their operations have also been significantly assisted by the same organisations, either public sector ones (mainly OAE) or NGOs (LNGOs and INGOs), indicating that none of the FOs in the study areas could operate independently. FGs and FAs have similar structures, managed and coordinated by a leader, a deputy leader, a treasurer and a secretary; said FO management committees are elected by the members. Given the requirements for formal registration, an AC has a more coherent management structure, and is managed by a board of directors, board of auditors, and a manager. The sample FAs and ACs basically evolved from FGs. Sample FO members' households were highly dependent on support agencies' agenda and strategies; thus, if the groups had been formed from only poor and disadvantaged households, the FOs' operations were unlikely to be successful. All the sample FO members were in households with various levels of socio-economic welfare.

117. The major organisational challenges impeding the operation of FOs are lack of sufficient credit resources, members' illiteracy, low adoption of agricultural techniques, and low participation. For instance, deposits accumulated by poor and medium resourced FOs through their members' small savings could not provide sufficient funds for lending to FO members for investment in agricultural production. Members' illiteracy negatively affects FOs' ability to plan and implement activities in general, and can engender mistrust between FO management and members with regard to financial management, thus resulting in members' low participation in collective group action. FOs' limited ability to extend credit services has hindered many FO members from adopting improved agricultural practices from FOs' support agencies to improve their productivity; improved techniques require more and better inputs use for crop management, for instance, fertilisers and pesticides. Therefore, poorly resourced members (FGs and some FAs) have generally had a low impact on participation. Other main organisational challenges facing FOs in Cambodia are: poor group structure; lack of adequate farmland; limited planning skills; problems with leadership (lack of partisanship and low accountability); lack of good leadership (ineffective coordination and planning); and poor enforcement of internal rules and regulations. The greater challenges facing FOs reflect the greater outside support needed if FOs are to have a positive and effective impact on rural household food security.

118. With regard to challenges to legal framework, qualitative findings show that many FAs were not legally registered due to the complexity of the registration process, red tape and low benefits from being officially registered. However, OAE, a key agency within MAFF, has been proactive in helping and promoting informal groups (FGs) to become legal entities by strengthening their structure and management skills through providing training services (both technical and management capacity) in the study areas. Many well structured and mature FGs and/or non-registered FAs expressed willingness to become an AC. Through the PDA, MAFF has provided initial start-up financial capital to some ACs, which has made a significant contribution to improving AC members' livelihoods through improved agricultural productivity. However, inputs and market access assistance for existing registered ACs were largely insufficient. Some ACs expressed a critical concern that if their main activity remains focussed on just savings and lending, the cooperatives' business activities will not improve, impeding potential livelihood improvement as well as the cooperatives' sustainability.

119. Among the eight hypotheses statistically tested from the survey data of this study, only three hypotheses can seemingly be accepted. These hypotheses are: (i) productive capital of household which is negatively associated with participation in FOs (hypothesis 1b); (ii) AC has positive relationship with the revenues and profits of rice and livestock productivity (hypothesis 2d); and (iii) AC members' revenues and profits from rice and livestock production are higher than FG members' (hypothesis 3b). The other five hypotheses cannot be accepted given their lack of statistical significance. Empirical analysis of the survey data also reveals that the factors affecting FO participation differ between the pooled sample (all FOs) and sub-samples (FGs, FAs, ACs). The age of household head had a positive and significant probability on participation in FOs, but household heads older than 54

were less likely to become a FO member in the pooled and sub-samples, with the exception of FGs where the household head's age was not a significant determinant of participation. The significant negative relationship between male-headed households and participation in FOs suggests that a higher proportion of female-headed households in the pooled sample and sub-sample of FAs were likely to join FOs, but this was not so for FGs and ACs. Unemployment of household head and size of household had a significant negative impact on participation, whereas access to credit was a key positive determinant of the propensity to participate in an FO, i.e. in pooled and sub-samples of FGs, FAs and ACs.

120. Households that have productive agricultural assets for agricultural purposes were likely to participate in FOs for pooled sample. Household wealth has a positive relationship with participation in FOs, but this relationship turns to a negative impact on participation when households became rich with total assets worth 13.6 million riels or more. Thus, farmers with higher level of productive capital are less likely to become FO members in pooled sample and AC sub-sample. Education of household head was not a significant determinant of participation in all types of FOs, suggesting that rural producers with both lower and higher level of human capital join FOs in Cambodia, rejecting the main argument that farmers with higher level of human capital are less likely to participate in FOs.

121. In conclusion, our empirical evidences suggest that FOs still have limited contribution to achieving food security. Improvement in agricultural productivity is largely attained through the use of improved agricultural techniques, mostly from support agencies. The collective action by FO members in accessing inputs and selling outputs are almost absent based on the survey – members remain accessing markets individually. In addition, organisational challenges such as low planning and management skills of FO leaders, members' illiteracy, low participation by members, lack of financial capital for credit to members, low adoption of advanced production techniques, to mention a few, are the main obstacles to FOs' functions and operations, thereby limiting their impact on members. These findings suggest that the FO sector in Cambodia is still the early stages of development. Increased efforts need to be made to increase the impact of participation in FOs on livelihoods. Many NGOs and public sector (OAE/PDA of MAFF) are actively supporting FOs' operation; the engagement of the private sector, however, is not visible, indicating that FOs are unlikely to operate sustainably. The study suggests that a combination of an FO development strategy and contract farming scheme could help sustain FO operations and increase their impact on memberships. It is in this context that the private sectors could play a crucial role in providing services, inputs supply, and secure market of produce.

5.1 Policy implications

122. Given the government's policy to promote rice export through FO development and the positive relationship between AC rice productivity and livestock production, existing FOs should be further supported and promoted even though they are not yet fully functional. The policy implications that can be drawn from the findings of this study are as follows:

1. Challenges facing FOs are organisational difficulties (e.g., lack of good leadership, low participation by members, illiteracy of members) and weak organisational capacity (poor management/leadership ability, low financial management skills, low planning capacity, lack of financial resources) are major obstacles to FOs' operations, which in turn lead to low impact on members. Policies that respond to these organisational challenges would increase and significantly help the FO sector in Cambodia and FOs' sustainable and positive effect on livelihoods. Priorities are in capacity building to aid FOs' leadership and management skills, strategic and business planning, financial management, and/or human resource management.

2. Technical services provided by support agencies (public sector and NGOs) are positive and significantly contribute to improving FO members' agricultural productivity. However, some FO members (especially poorly resourced ones) do not adopt the taught production techniques as they are too complex to follow and demand technical, managerial and/or financial resources. To be more effective and practical, agricultural technical services offered to FO members should be simple, specific and clear and respond to their need.

3. A major constraint in all types of FO is the lack of financial capital for lending to members. The average loan size is less than USD80 for three to six months period with an average interest rate of 3 percent per month. Loans are mainly used to invest in production inputs which distinctly contribute to improved crop and livestock productivity. However, increasing FO savings capacity is not a feasible option because most members are poorly resourced. Therefore, the policies that help FOs access to rural credits from any operating banks/ MFIs should be further improved to better help FO members in increasing investment in agricultural production and initiating other business activities, which in turn could increase food security and improve livelihood.

4. Many FOs operating in Cambodia are highly dependent on and largely assisted by external players. Such external support (see items 1 & 2 above on leadership and managerial skills and technical extension services) provided to FOs should be committed over an extended time to allow FOs to learn to be effective and efficient so they can eventually operate independently. Furthermore, support should be targeted to specific groups so they can get off to a strong start and flourish, rather than spreading support and subsidies too thinly across a wide range of FOs.

5. Our empirical evidence shows AC members are better off compared to FG and FA members and non-members, thus it has positively associated with rural household food security through improved rice and livestock productivity. However, policy that supports and promotes FOs could be enhanced by stakeholders not only ACs but also other types of FOs because well-functioning FGs basically develop into AC. Given limited resources of both NGOs and public institutions, policy that offers incentives for private sector investment may help sustain FO operations and to also assist FOs in accessing services, inputs supply and market access through contract farming scheme, thereby increase the impact of participation in FOs on food security and improved livelihoods.

6. Many FOs are willing to stay outside the protected legal framework (FGs and FAs), due to the complexity and demands of the registration process. Legal recognition would provide benefits to members in the long run (AC), for instance legal protection for initiate business activity. Therefore, to provide incentive for FOs to register legally with the relevant authority, i.e. the Ministry of Interior (MoI), Ministry of Agriculture, Forestry and Fisheries (MAFF) or Ministry of Commerce (MoC), the registration process would be largely eased simply by reducing the demand for required documents, expediting registration procedures, and cutting the amount of red tape.

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7. Annexes

Annex 1: Guidelines for Qualitative Semi-structured Interviews

1. Key Questions

1.1 FO Support Agencies (government agencies, INGOs, and NGOs)

- Q1.1.1: Please tell me how the idea for this (FO) project came about? What process did you go through to determine the broad parameters of the project (i.e. the aims and objectives)? Are you happy with this process? Do you think it could be improved in some way?
  (Probe specific issues related to FO's aims or objectives whether they were designed to benefit only specific type of farmers (rich, medium, or/and poor))
- Q1.1.2: Could you tell me about the process for establishing a farmer organisation (FO)? Are you happy with this process? Do you think it could be improved in some way?
  (Probe membership requirements for all types of member, including at each stage of establishment, which may affect the decision making of farmers with different levels of welfare (rich, medium, and poor) on whether to join an FO; and also the possible solutions to address those issues)
- Q1.1.3: Could you tell us who mostly join FOs? Poor, middle or rich farmers? Why do they participate in FOs?
  (Probe reasons and possible solutions)
- Q1.1.4: Once FOs had been established, what activities did you have to support them? Are you happy with this process of implementation? Do you think it could be improved in some way?
  (Probe activities (and related issues) to develop members' agricultural production to improve income, and help to facilitate the group, providing capacity building, supplying inputs, direct marketing, transport)
- Q1.1.5: What benefits did they have once the FO had begun? How will joint returns be distributed? Are you happy with the benefit they received? Do you think it could be improved in some way?
  (Do FOs really improve farmers' agricultural productivity and provide economic and social benefits?)
- Q1.1.6: What challenges did you encounter once the FO had been organised? Are you happy with the process of dealing with these challenges? Do you think it could be improved in some way?
  (Probe challenges that might impact on farmers' decision to join an FO)
- Q1.1.7: What are the existing legal and regulatory environments for operating an FO in Cambodia?
- Q1.1.8: Are there any benefits from registering an FO? What do you think about the legal registration process? Easy or difficult? In what way do you think that the registration process could be improved or made more convenient?

- Q1.1.9: What formal or informal incentives might pre-dispose MoI and MAFF towards a particular mechanism?"
- Q1.1.10: What changes are needed in existing legal and regulatory framework to make them more relevant to improving the effectiveness of FOs?
- Q1.1.11: From your previous experience, what characteristics of FO leaders contribute to helping members improve their household food security? Conversely, what characteristics are not so helpful?
- Q1.1.12: In general, please list five main factors affecting FO member's livelihood?
  (Please use this scale: 1=Not affected, 2= Little, 3=Some, 4=Considerably, 5= Strongly affected.
- Q1.1.13: Are there any other comments you would like to add?

1.2 FO Leaders

- Q1.2.1: I have learned from the FO support agency that you are a leader of the FO, what is the FO about (i.e. aims and objectives)? How did the idea for this FO come about? Are you happy with this process? Do you think it could be improved in some way?
  (Probe specific issues related to FO's aims or objectives whether they were designed to benefit only specific types of farmers (rich, medium, or/and poor))

- Q1.2.2: Could you tell me how (i.e. process) you were selected as a FO leader? Are you happy with this process? Do you think it could be improved in some way?
  (Probe requirements for all types of member to join FO; each establishing stage which may affect the decision making of different level of farmers (rich, medium, and poor) to join; and also the possible solutions to address those issues)

- Q1.2.3: Could you tell us who mostly join FOs? Poor, middle or rich farmers? Why do they participate in FOs?
  (Are there different categories of members? Probe reasons and possible solutions)

- Q1.2.4: What activities did you undertake once the FO had been organised? Are you happy with this process of implementation? Do you think it could be improved in some way?
  (Consider activities related to group activities: rice and vegetable producing, and livestock raising to increase income to improve livelihoods)

- Q1.2.5: What benefits did you have once the FO had begun? How will joint returns be distributed? Are you happy with the benefit you received? Do you think it could be improved in some way?
  (Do they really improve agricultural productivity and provide economic and social benefits?)

- Q1.2.6: What challenges did you meet once the FO had begun? Are you happy with this process of dealing with those challenges? Do you think it could be improved in some way?
  (Probe internal and external issues related to: capacity building, participation, trust, benefit distribution, finance, bookkeeping, recording book, marketing, communication with outsiders (government, NGOs, commercial groups) and local authority; also possible solutions. These challenges might affect FO improvement)
- Q1.2.7: What external support did your FO receive and from whom? How has this external support impacted on your FO?
- Q1.2.8: What are the existing legal and regulatory environments for operating FOs in Cambodia?
- Q1.2.9: Are there any benefits from registering an FO? What do you think about the legal registration process? Easy or difficult? In what way do you think that the registration process could be improved or made more convenient?
- Q1.2.10: What formal or informal incentives might pre-dispose MoI and MAFF towards a particular mechanism?"
- Q1.2.11: What changes are needed in existing legal and regulatory framework to make them more relevant to improving the effectiveness of FOs?
- Q1.2.12: From your previous experience, what characteristics of FO leaders contribute to helping members improve their household food security? Conversely, what characteristics of the FO leader are not so helpful?
- Q1.2.13: In general, please list five main factors affecting FO members' livelihoods?
  (Please use this scale: 1=Not affected, 2= Little, 3=Some, 4=Considerably, 5= Strongly affected)
- Q1.2.14: Are there any other comments you would like to add?

1.3 FO Members

- Q1.3.1: I have learned from your FO leader that you are a member of the FO. What is the FO about (i.e. aims and objectives)? How did the idea for this FO come about (why did you join the FO)? Are you happy with this process? Do you think it could be improved in some way?
  (Probe specific issues related to FO's aims or objectives whether they were designed to benefit only specific type of farmers (rich, medium, or/and poor))
- Q1.3.2: Could you tell us who mostly join FOs? Poor, middle or rich farmers? Why do you participate in FOs?
  (Are there different categories of members? Probe reasons and possible solutions)
- Q1.3.3: Could you tell me about the particular process through which you selected your FO leader? Are you happy with this process? Do you think it could be improved in some way?

- Q1.3.4: What activities did you have once the FO had been organised? Are you happy with this process of implementation? Do you think it could be improved in some way?
  (Consider activities related to group activities: rice, vegetable producing, and livestock raising to increase income to improve livelihoods)
- Q1.3.5: What benefits did you receive from being a member of the FO? How will joint returns be distributed? Are you happy with this benefit? Do you think it could be improved in some way?
  (Do they really improve agricultural productivity and economic and social benefits?)
- Q1.3.6: What challenges have you met after organising the FO? Are you happy with the process of dealing with those challenges? Do you think it could be improved in some way?
  (Probe internal and external issues related to: capacity building, participation, trust, benefit distribution, finance, bookkeeping, recording book, marketing, communication with outsiders (government, NGOs, commercial groups) and local authority; also possible solutions. These challenges might affect to FO improvement)
- Q1.3.7: From your previous experiences, what good characteristics of FO leaders contribute in helping members improve food security? Conversely, what characteristics of FO leader are not so helpful?
- Q1.3.8: In general, please list five main factors affecting FO member's livelihood?
  (Please use this scale: 1=Not affected, 2= Little, 3=Some, 4=Considerably, 5= Strongly affected)
- Q1.3.9: Are there any other comments you would like to add?

Annex 2: Additional tables for Empirical Results

Table A-1: Characteristics of households for FO members and non-members

Characteristics	Members	Non-members
Gender of household head (n=330 /365)		
Male (%)	74.85	79.73
Female (%)	25.15	20.27
Mean age of household head		
Male (n= 247 / 291)	47.19	46.88
Female (n=83 /74)	52.29	54.43
Educational attainment of household head (n= 330 / 363)		
None (%)	20.91	28.37
Primary school (%)	52.42	50.69
Secondary school (%)	20.91	16.53
High school (%)	5.45	4.13
Mean years of schooling of household head		
Male (n= 247 / 290)	4.84	4.03
Female (n= 83 /73)	2.88	2.16
Household size (n= 330/ 365)		
Single person households (%)	1.21	1.64
2 - 4 members (%)	39.09	37.26
5 - 7 members (%)	45.76	53.42
8 or more members (%)	13.94	7.67
Mean household size (male-headed/ n= 247 / 291)	5.38	5.14
Mean household size (female-headed/ n= 83 / 74)	4.70	4.53
Mean household size (all households/ n= 330 /365)	5.21	5.02

Average number of adults per household (n= 330 /365)	3.63	3.37
Average dependency ratio per household (n= 330 /365)	0.57	0.60
Household labour power [a/]		
Mean household labour power (male-headed/ n= 247 / 291)	4.28	3.94
Mean household labour power (female-headed/ n= 83 / 74)	3.71	3.68
Mean household labour power (all households/ n= 330 / 365)	4.14	3.88

[a/] Household labour power is an index of available household labour calculated as: LP =0.5P6-14 + 0.75P15-17 + 1P18-59 + 0.75P60 and older , where P=number of persons, and subscripts are age categories of household members

Table A-2: Employment of HH head and individual HH members

Categories	Employment of **household head**			Employment of **individual members**		
	Members	**Non-members**	Overall	**Members**	**Non-members**	Overall
	(%)	(%)	(%)	(%)	(%)	(%)
Unemployed	28.79	38.90	34.10	51.22	52.96	52.11
Selling labour in village (farm)	10.00	9.86	9.93	7.69	6.38	7.02
Selling labour outside village (farm)	5.15	7.40	6.33	7.50	9.98	8.77
Migration to work at border	1.21	2.19	1.73	1.17	2.40	1.80
Migration to work in other country	0.61	1.10	0.86	2.63	3.05	2.84
Civil servant/NGOs/ company	7.88	5.21	6.47	4.38	3.14	3.75
Small business / street vendor	25.76	18.08	21.73	10.52	10.17	10.34
Collecting CPR from water or field	11.52	12.05	11.80	2.34	1.94	2.13
Equipment and animal rental	0.61	0.00	0.29	0.00	0.09	0.05
Construction worker	14.55	9.86	12.09	4.58	3.23	3.89
Money lending	1.21	0.27	0.72	1.36	0.37	0.85
Handicrafts/ artisan	3.33	2.74	3.02	1.07	2.13	1.61
Selling labour within village (non-farm activities)	3.03	4.38	3.74	3.12	2.03	2.56
Working in manufacturing enterprise	0.00	0.00	0.00	6.33	4.62	5.45
Other	0.91	1.92	1.44	0.10	0.09	0.09
Total households/individuals	**114.56**	**113.96**	**114.25**	**104.01**	**102.58**	**103.26**

Table A-3: Distribution of sample households by land holding

Category	Land Owned (m^2)	Members		Non-members		Overall	
		n	%	n	%	n	%
Landless	0	17	5.15	35	9.59	52	7.48
Small	<10000	124	37.58	137	37.53	261	37.55
Intermediate	10000 - 19999	89	26.97	92	25.21	181	26.04
Medium	20000 - 29999	38	11.52	40	10.96	78	11.22
Large	>30000	62	18.79	61	16.71	123	17.7
Total		330	100	365	100	695	100

Table A-4: Main reason for accessing credit/loan by members and non-members (% of HH reporting)

Reason to access loans	Members		Non-members	
	n	%	n	%
Farming (rice and vegetables)	96	40.34	66	30.70
Livestock raising	29	12.18	16	7.44
Buying inputs for business/trade	47	19.75	37	17.21
Household consumption (food and non-food)	48	20.17	42	19.53
Health	38	15.97	33	15.35
Education	8	3.36	4	1.86
Repay another loan	8	3.36	11	5.12
Social ceremonies (marriage, funeral)	9	3.78	7	3.26
Other emergency (fire, food, theft, conflict)	1	0.42	0	

Building/renovating house	21	8.82	18	8.37
Expenditure on migration to work at border	3	1.26	2	0.93
Connecting to electricity supply	0		1	0.47
Other	6	2.52	4	1.86
Total (n)	**314**		**241**	

Table A-5: Sources of training services by members and non-members (%of HH reporting)

Source of training	Members (%)			Non-members (%)		
	Crops	Livestock	Market access	Crops	Livestock	Market access
Neighbours	13.29	11.24	30.74	30.81	32	46.01
Local authority	3.5	2.01	1.64	4.74	4	2.45
Supporting agencies	29.02	29.72	20.9	1.9	2.67	0
Relatives/friends	2.1	1.2	2.87	6.64	2	3.68
Group members of FO	2.1	4.82	5.33	0.95	0	1.23
Traders	1.75	3.21	26.23	5.21	6.67	40.49
PDA	29.72	26.1	10.25	21.8	14	2.45
Self-study	5.59	7.63	12.3	19.91	24.67	20.86
Other NGOs	41.61	36.14	17.62	37.91	30.67	9.82
Media system	3.5	3.61	5.74	5.69	4.67	7.36
Other	1.75	0.8	1.64	0.47	0	0.61
Total (n)	**383**	**315**	**330**	**287**	**182**	**220**

Table A-6: Access to farming/livestock quality inputs (percentage of HH reporting)

Farming inputs access	Members		Non-members		Chi^2-Test	P-Value
	n	%	n	%		
Access quality inputs						
Seeds/seedlings	150	45.45	142	38.90	5.53	0.06
Fertilisers	180	54.55	198	54.25	0.25	0.88
Pesticides	152	46.06	129	35.34	10.09	0.01
Animal feed	114	34.55	81	22.19	13.11	0.00
Animal births	117	35.45	114	31.23	3.10	0.21
Animal vaccination	124	37.58	91	24.93	13.54	0.00
Individual buying						
Seeds/seedlings	199	88.05	216	98.63	-19.79	0.00
Fertilisers	223	90.28	264	98.51	-16.9	0.00
Pesticides	189	96.92	170	98.27	0.69	0.41
Animal feed	137	97.86	116	100.00	2.52	0.11
Animal births	167	96.53	164	98.20	0.92	0.34
Animal vaccination	126	88.11	102	91.89	0.97	0.32
Group buying						
Seeds/seedlings	27	11.95	3	1.37	19.79	0.00
Fertilisers	24	9.72	4	1.49	16.91	0.00
Pesticides	6	3.08	3	1.73	0.69	0.41
Animal feed	3	2.14	0	0.00	2.52	0.11
Animal births	6	3.47	3	1.80	0.92	0.34
Animal vaccination	17	11.89	9	8.11	0.97	0.32

Table A-7: Market accessibility (percentage of HH reporting)

Products	Members		Non-members		Chi2-Test	*P*-Value
	n	%	n	%		
Sale surplus products						
Rice	200	60.61	193	52.88	7.4487	0.024
Vegetables	135	40.91	101	27.67	19.1363	0.000
Chickens	257	77.88	243	66.58	12.3697	0.002
Ducks	82	24.85	84	23.01	0.4629	0.793
Pigs	160	48.48	153	41.92	3.2171	0.200
Cattle	157	47.58	154	42.19	7.823	0.020
Buffalo	14	4.24	16	4.38	2.224	0.329
Individual sale						
Rice	247	93.21	252	96.55	3.0199	0.082
Vegetables	178	98.89	139	100.00	1.5542	0.213
Chickens	286	100.00	281	100.00	-	-
Ducks	91	100.00	95	98.96	0.953	0.329
Pigs	186	100.00	182	100.00	-	-
Cattle	189	100.00	175	100.00	-	-
Buffalo	16	100.00	16	100.00	-	-
Group sale						
Rice	18	6.79	9	3.45	3.0199	0.082
Vegetables	2	1.11	0	0.00	1.5542	0.213
Chickens	0	0.00	0	0.00	-	-
Ducks	0	0.00	1	1.04	0.953	0.329
Pigs	0	0.00	0	0.00	-	-
Cattle	0	0.00	0	0.00	-	-
Buffalo	0	0.00	0	0.00	-	-

Table A-8: Average treatment effects of PSM for rice crop before and after matching

Outcome variable	Nearest neighbour matching				Kernel matching			
	Difference (ATT)		T-stat		Difference (ATT)		T-stat	
	Un-matched	Matched	Un-matched	Matched	Un-matched	Matched	Un-matched	Matched
Rice revenue								
Pooled sample	12.88	8.74	1.46	0.85	12.88	8.59	1.46	0.93
FG	4.01	-4.00	0.37	-0.29	4.01	-1.22	0.37	-0.10
FA	-1.27	23.34	-0.1	1.36	-1.27	-0.95	-0.1	-0.07
AC	45.76	35.44	3.38***	1.91**	45.76	32.61	3.38***	2.07**
Rice profit								
Pooled sample	19.39	8.23	1.23	0.41	19.39	12.94	1.23	0.75
FG	1.64	-13.10	0.08	-0.79	1.64	-1.44	0.08	-0.07
FA	2.67	6.07	0.1	0.23	2.67	0.37	0.1	0.01
AC	71.15	50.19	2.67**	2.43**	71.15	52.87	2.67**	2.41**

Note: *, **, *** indicate statistically significant difference at 10%, 5% and 1% respectively

Table A-9: Average treatment effects of PSM for livestock

Outcome variable	Nearest neighbour matching				Kernel matching			
	Difference (ATT)		T-stat		Difference (ATT)		T-stat	
	Un-matched	Matched	Un-matched	Matched	Un-matched	Matched	Un-matched	Matched
Livestock revenue								
Pooled sample	102.20	84.30	2.06	1.48	102.20	90.33	2.06	1.79*
FG	-36.57	-27.86	-0.81	-0.54	-36.57	-30.50	-0.81	-0.77
FA	209.08	190.14	2.69**	1.44	209.08	200.92	2.69**	1.76*
AC	215.76	-17.68	3.13***	-0.17	215.76	150.99	3.13***	1.72**
Livestock profit								
Pooled sample	65.23	41.79	1.75*	0.95	65.23	55.59	1.75*	1.46
FG	-24.21	-12.15	-0.58	-0.25	-24.21	-18.56	-0.58	-0.51
FA	119.95	36.80	2.08**	0.44	119.95	116.56	2.08**	1.65*
AC	156.31	-72.51	2.66**	-0.84	156.31	109.16	2.66**	1.67*

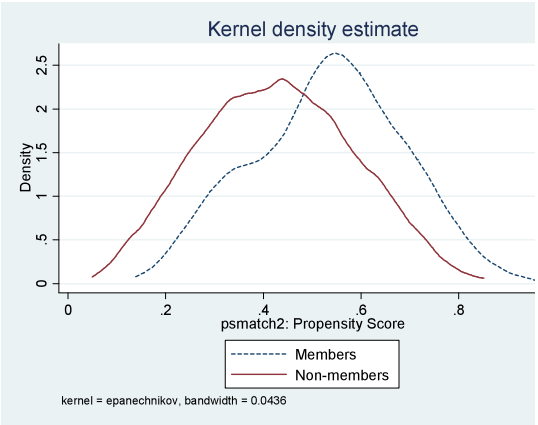
Note: *, **, *** indicate statistically significant difference at 10%, 5% and 1% level, respectively.

Table A-1: Sources of loan taken by members and non-members (percentage of HH reporting)

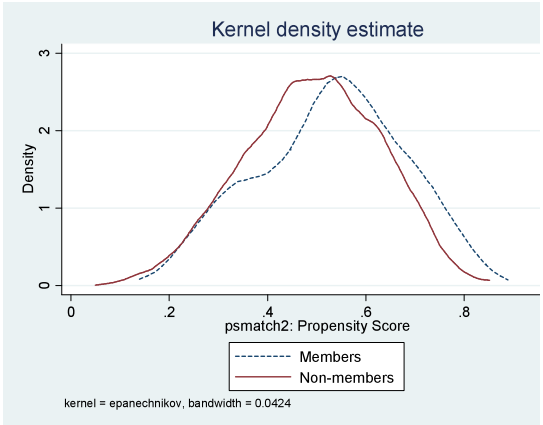
Sources of credit	Members		Non-members	
	n	%	n	%
Relative/friend	43	18.07	65	30.23
Money lender	55	23.11	47	21.86
Supporting agency	17	7.14	7	3.26
FO (savings group, other association	125	52.52	11	5.12
MFI	77	32.35	103	47.91
Other	4	1.68	1	0.47
Total (n)	**321**		**234**	

Figure A- 11: Kernel distribution of propensity score before and after matching

A1: Pooled Sample Before Matching

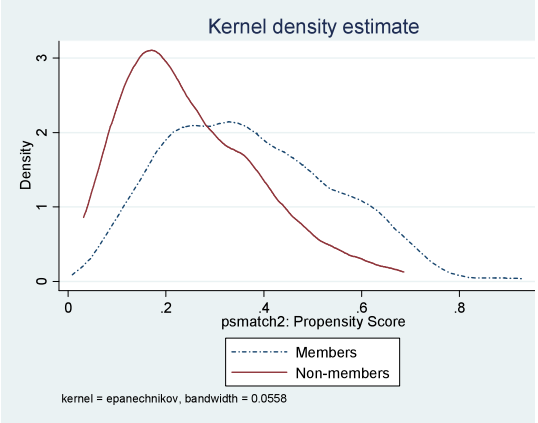


A2: Pooled Sample After Matching

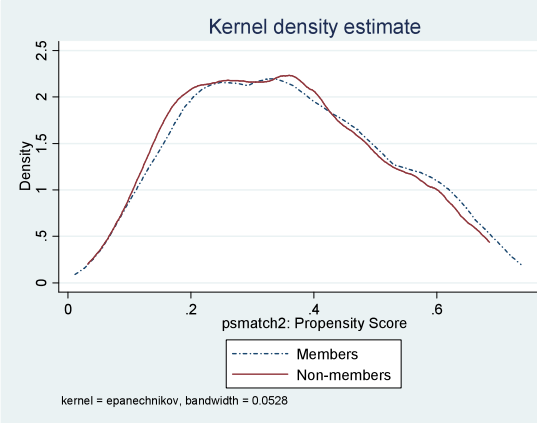


B1: FG Before Matching

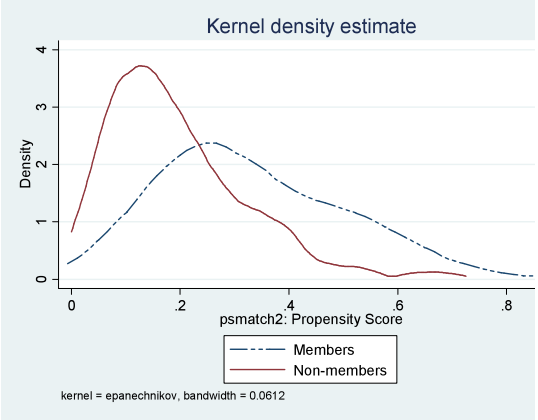
B2: FG After Matching



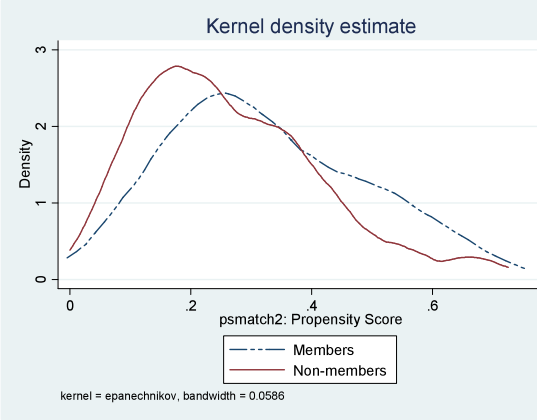
C1: FA Before Matching



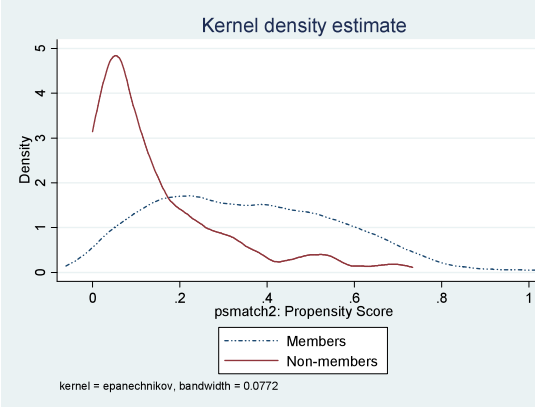
C2: FA After Matching

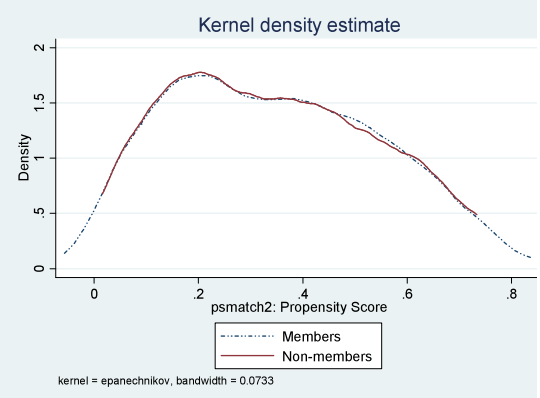


D1: AC Before Matching (kernel)



D2: AC After Matching (kernel)





Annex 3: Technical Concepts to Methodology

In principle, the studies of impact assessment basically encounter three interrelated challenges: 1-establishing the predicted outcome in the absence of the intervention (a viable counterfactual or recalled information), i.e what would happened to the participant had they not participated in the intervention project, 2-attributing the impact to the treatment or intervention, 3-dealing with unprecedented lag times (if the number of observed years is quite large) (Alston and Pardey 2001; Salter and Martin 2001 cited in Davis et al., 2010). To address the problems / challenges, some major methods have been generally employed as follows:

- **Randomization / experimental approach**: well-defined set of people is randomly selected into treatment and control groups.
- **Reflexive comparisons**: no control group is needed, but baseline survey of participants is conducted before the intervention.
- **Instrumental variables methods**: These kinds of variables are used to predict the program participation under a restrictive assumption that the variables have no impact on the outcomes given participation. However, finding instrument variables (IV) is a difficult task in empirical analysis (Ali and Abdulai, 2010). In our study, we were not able to find some variables to address endogenous variables (participation in FOs or access to credit), we will basically use results from OLS.
- **Quasi-experimental and non-experimental approaches**: The comparison or control group is constructed by matching. The methods include propensity score matching and the double-difference estimator (if baseline data is in place) (Ravallion, 2001).

Due to the lack of baseline information in this study and to the absence of experimental study, investigating the changes in outcomes in treatment group and control is impossible; the experimental and reflexive comparison approaches are not applicable for this study. Hence, constructing control group through the propensity score matching (PSM) approach with its results reinforced by OLS.

Below are the specifics of the methods employed in this study, including the application of the PSM.

1. Model Specification for the Participation in FOS

According to Baum (2006), one can use either a logit or a probit model to investigate participation behaviour in a programme, which is expressed in the following form.

$$I_i^* = z_i\beta_i + u_i, \quad (1)$$

where $I_i = 1$ indicates participation of a household i in FO, which is denoted by $I_i^* > 0$ if the perceived benefits from participation are positive, and $I_i = 0$ if otherwise; z_i is a vector of the household i characteristics[25]; β_i is a vector parameter or estimator; and u_i is the random error term. The independent variables for logit model of participation in FO are specified and defined in Table 4.5 in Section 4.2.

The dependent and explanatory variables of our empirical framework and the definitions of equation (1) can be found in Tables 4.5, 4.6 and 4.7 in Section 4.

The analytical framework for the benefits of the participating FO is defined by the following equation:

$$\pi = PmQ(X;z,m) - X'rm - C(m) \quad (2)$$

where z is a vector of household characteristics; member status m $\in\{0, 1\}$; production Q depends on inputs used (X), household characteristics (z), and membership status (m). The production prices p and inputs prices r may depend on the membership status; C(1) is cost of membership fee, but no membership fee is charged in Cambodia, thus C(1)=C(0)=0.

We assume that membership (m=1) in FOs may improve household income through agricultural productivity due to: 1) lower price of inputs as FOs buy large quantities, lower transport costs, or access to low-cost in-kind credit for inputs provided by FOs. i.e. ($r(1)<r(0)$); 2) technical assistance (fertiliser, pesticide, better production techniques) from FOs' support agencies, so the production $Q(X;z,0)<Q(X;z,1)$ for all X and z; 3) output prices negotiated by FOs may be better than what individual household can get ($p1>p0$) because FOs have more bargaining power due to bulk sales and lower transaction costs for buyers. Therefore, it could be expected that the productivity of households who are members of a FO may be higher than those who are non-FO members.

Propensity Score Matching

Testing hypotheses 3a 3b by using PSM entailed three stages:

First, we used a logit model to analyse the characteristics of households that are likely to participate in FOs, all of which can be expressed in equation (1). The results obtained from the logit regression show the characteristics of households who are

[25] For further details about households likely to join the intervention projects, please see Davis *et al.* (2010); Miyata *et al.*, (2009); Ali &Abdulai (2010); Bachke (2010).

likely to participate in FOs. It particularly tests the hypothesis that households with higher levels of human and productive capital are less likely to participate in FOs.

Second, we used an impact estimator model to find out whether FOs have any significant impact on household the revenues and profits for rice and livestock. According to Caliendo and Kopeinig (2008), the seminal assessment parameter is the average treatment effect on the treated (ATT) which is defined as the difference between *participants' expected outcome with the project* $(E[y(1)|D=1])$ and *their expected outcome if they had not engaged in the project* $(E[y(0)|D=1])$. The ATT can be summarised as follows:

$ATT =$ [ ] - [ ]

where *D=1* represents participation in the project, and *D=0* otherwise. Likewise, *y(1)* indicates the outcome for participants when taking part in the project, while *y(0)* is the counterfactual outcome for the same participants without taking part.

However, the estimate for the counterfactual outcome of the participants without the project ([ ]) is far from feasible in reality because it is also unobservable (Ravallion 2001). To deal with the bias challenges, Dehejia and Wahba (2002) and Blundell and Dias (2000) as well as Caliendo and Kopeinig (2008) suggest using propensity score matching (PSM), in which participants and non-participants with comparable propensity score – the estimated conditional probability of participation given observed characteristics – are matched. The observations on whose propensity scores are not comparable (not in common support) are dropped from the analysis. The estimated average of impact of treatment (i.e. participation in FOs) on the treated (i.e. FO members) is the difference in outcomes between the two matched groups (Smith & Todd, 2005). Given the framework of this study, this approach was applied to detect the significant impacts of farmers' participation in FOs on their household's livelihoods[26]. By using propensity score matching adapted from Guo and Fraser (2010) and Ravallion (2001), the analytical process of PSM is presented as follows:

- **Step1:** In our sample selection, we construct a control group of FO non-members to facilitate matching; the treatment group is represented by the FO members.
- **Step 2:** We estimate the probability of a household participating in an FO by using logit regression as described above. This was already done in the first empirical analysis in equation (1)
- **Step 3:** After running regression of the logit model (equation (1)), we could predict propensity scores for every sample FO member and their non-member counterpart.

[26] This approach could be applied to the pooled sample of the whole study and separated pooled sample groups, i.e. farmer group, farmer association and agricultural cooperative

- **Step 4:** After propensity score is estimated, the analysis proceeds with matching the members and non-members based on propensity scores using the two matching algorithms – nearest neighbour (NN) and kernel estimators. Our interpretations were based on the algorithms which produced statistically significant results.
- **Step 5:** We check the region of common support to avoid comparing incomparable observations which could result in evaluation bias. The observations with scores smaller than the minimum or larger than the maximum in the counterpart group should be dropped. Alternatively, we could also check it through visual analysis of the density distribution of the propensity score in both groups.
- **Step 6:** The mean value (ATT) of the outcome indicators is calculated using weighted propensity score distribution in the following equation:

  $$\tau_{ATT}^{PSM} = E_{P(X)|D=1}\left\{E\left[y(1) \mid D=1, P(X)\right] - E\left[y(0) \mid D=0, P(X)\right]\right\}$$

  where *P(X)* is the predicted propensity score obtained in step 3. Table 3.1 presents the list of outcome variables (impact variables) for the comparison of food security impacts between members of FOs and non-members.
- **Step 7:** To check the quality of matching, we compare the matching indicators before and after matching. Mean and median of absolute bias and Pseudo R^2 are expected to decrease markedly after matching. In addition, the standardised bias (*pstest*) of each control variable in the logistic regression before and after the matching is also used to figure out whether there are systematic differences in the means of the control variables for both groups (Rosenbaun & Rubin 1983). After matching, no significant differences in control variables between both groups should be found.

To compare food security impacts between members of FOs and non-members, the pooled sample and sub-sample data were used since the study FO members' group comprises FGs, FAs and ACs. This enabled the analysis of which types of FO significantly impact on members' food security at the household level when compared with non-members.

In the third stage of the empirical analysis, t-test was used, as modelled by the *t* distribution to test the null hypothesis that there is no statistical difference in the average agricultural productivity between FG and FA and FG and AC. In other words, we aim to compare benefits of participation among FG and FA and AC members without taking non-members into account. By using STATA package, we can reject the null hypothesis when the *p-value* is less than 0.01, 0.05 and 0.1 at 1 percent, 5 and 10 percent significance levels, respectively (i.e. our suggested hypothesis is accepted). However, if the *p-value* is greater than 0.1, we fail to reject the null hypothesis.

Econometric Specification for OLS approach

$$yi=\beta o+kakXik+\gamma FOi+\varepsilon i$$

$$i=1,2,3,\ldots,n;k=1,2,3,\ldots,m$$

where yi is a set of outcome variables of firms i; Xi is a set of observed household characteristics including access to credit. FO represents dummy membership of firms in FO (AC, FA and FG), where 1 denotes membership and 0 otherwise; εi is the randomly distributed error term indicating the unobservable factors affecting the outcome variable with zero conditional mean $E\varepsilon iXi,Mi=0$; πk and γ are parameters to be estimated. In empirical studies, both decision to participate in a program and access to credit are influenced by external forces (endogenous variables) if it is used as explanatory variables. Thus, the OLS model is subjected two endogenous variables, which are not able to address because we have to find a variable that affecting endogenous variable, but not affecting dependent variable yi.

Annex 4: Additional Tables of Regression Results

Table A4-1: Definition of variables and descriptive statistics

Variables	Description
head_age	Age of household head
head_age_sq	Age of household head squared
head_educa~n	Number of years of household head's schooling
head_liter~y	HHH can read and write(dummy)
head_male	HHH is male (dummy)
head_married	HHH is married (dummy)
head_unemp~d	HHH is unemployed (dummy)
hhsize	Household size
hhsize_sq	Square of Household size
pro_dep_ra~o	Dependents ratio (adults aged 15-65 years)
agri_incom~e	Agriculture is primary source of HH income (dummy)
Credit	Household access to loan in last 12 months (dummy)
FO	HH member participate FO (dummy)
AC	HH member participate AC (dummy)
FA	HH member participate FA (dummy)
FG	HH member participate FG (dummy)
agri_index	Index of household agricultural assets
assets_value	Total value of assets (0000 riel)
assets_val~q	Square of asset value
Irrigated land	1 if any household's cultivated parcels of land is irrigated; 0 otherwise.

Table A4-2: OLS regression results 1 (Robust Standard Error)

Dependent Variable=Rice Revenue per Ha (in logarithm)				
	(a)	(b)	(c)	(d)
FO	**.03934634**	-	-	-
head_age	.001373	.00530801	.0008108	-.00993195
head_age_sq	-.00003974	-.00005923	-4.673e-06	.0000584
head_educa~n	.01268264	.00748578	.01012441	.00969604
head_liter~y	.05209366	.05841616	.097331	.07484665
head_male	.22367687**	.14743123	.30010427**	.19619249
head_married	-.15715516	-.00488076	-.21419765	-.1314412
head_unemp~d	.06499812	.06107216	.01535112	.11036873
hhsize	-.24486879***	-.19314888**	-.22149887***	-.20993823***
hhsize_sq	.01666703***	.01129426*	.01497472**	.01506369**
pro_dep_ra~o	.03891524	-.00206749	-.0248106	-.00583905
agri_incom~e	.06048894	.00300583	.04124781	.06992995
credit	.09534512	.16590658**	.10440209	.12666936*
agri_index	.12023593***	.11309349***	.12558302***	.13994914***
assets_value	.00010017	.00008321	.00003828	-7.697e-06
assets_val~q	-5.566e-09	-1.054e-08	-8.618e-09	2.859e-09
irrigatedl~d	.10378042*	.16152592**	.18244944**	.1663477**
AC	-	**.20966359****	-	-
FA	-	-	**-.01609808**	-
FG	-	-	-	**-.02088258**

_cons	5.4825547***	5.2015429***	5.3874452***	5.6556076***
N	616	389	405	448
R-squared	0.1155	0.1260	0.1245	0.1018

legend: * p<.1; ** p<.05; *** p<.01

Table A 4-3: OLS Regression results 2 (Robust Standard Error)

Dependent Variable=Rice Profit per Ha (in logarithm)				
	(a)	(b)	(c)	(d)
FO	**.0509235**	-	-	-
head_age	.00243784	.00382739	-1.148e-06	-.00618806
head_age_sq	-.00004907	-.00004229	1.970e-06	.00002455
head_educa~n	.03008715	.01053871	.01672134	.0255468
head_liter~y	-.06910237	.03899352	.05203837	-.03104934
head_male	.26618988*	.18451534	.32399214**	.3211698
head_married	-.17691539	-.01209663	-.20556839	-.21799166
head_unemp~d	.08073763	.03502064	-.0064986	.06886651
hhsize	-.21873507***	-.16359749	-.14021349	-.20978272**
hhsize_sq	.01261697*	.00834244	.00546522	.01415876*
pro_dep_ra~o	.07895419	.01527412	.00326305	.04094132
agri_incom~e	-.09521995	-.24572581**	-.17213333	-.09680928

credit	.1062539	.15312579*	.14875057	.11852203
agri_index	.09499613**	.10155447**	.10346845**	.12477972***
assets_value	.0002103	.0003663**	.00018794	.0000777
assets_val~q	-1.068e-08	-7.402e-08	-3.198e-08	1.160e-09
irrigatedl~d	.02795725	.06916085	.1379275	.069315
AC	**-**	**.26355779****	**-**	**-**
FA	**-**	**-**	**.03641266**	**-**
FG	**-**	**-**	**-.09648085**	
_cons	5.1484528***	4.935565***	4.9922794***	5.343061***
N	589	373	386	426
R-squared	0.0825	0.1064	0.0827	0.0652

legend: * p<.1; ** p<.05; *** p<.01

Table A4-4: OLS Regression results 3 (Robust Standard Error)

Dependent Variable=Livestock Revenue per year (in logarithm)				
	(a)	(b)	(c)	(d)
FO	.07715171	-	-	-
head_age	-.02354677	-.04439375	-.01586926	-.02900717
head_age_sq	.00012166	.00032164	.0000287	.0001491
head_educa~n	.01430434	.02859985	.00614655	-.00187435
head_liter~y	-.10923447	-.19163347	-.18181235	-.07300208
head_male	-.28424757*	-.28300245	-.24405176	-.09084633
head_married	.07480172	-.12344215	.00196837	-.09666181
head_unemp~d	.12040505	-.0045258	.090794	-.00669481
hhsize	.15612546	.04785633	.17348251	.39331836***
hhsize_sq	-.01174435	-.00300326	-.01494557	-.02963973***
pro_dep_ra~o	.0610455	.18947832	.17572433	-.01333937
agri_incom~e	.19320868	.43416347**	.44012964**	.24578886*
credit	-.1743016	-.19051038	-.18924612	-.21430538
agri_index	.00474294	.03686053	-.02354918	.03638063
assets_value	.00300521***	.00281039***	.0031286***	.00316746***
assets_val~q	-7.059e-07***	-6.549e-07***	-7.087e-07***	-7.811e-07***
AC	-	**.02420217**	-	-
FA	-	-	**.19251776**	-
FG	-	-	-	**.06592972**
_cons	4.3498652***	5.1819715***	4.0089036***	3.9233712***

N	634	396	423	463
R-squared	0.3768	0.3594	0.4186	0.4065

legend: * p<.1; ** p<.05; *** p<.01

Table A4-5: OLS Regression results 4 (Robust Standard Error)

Dependent Variable=Livestock Profit per year (in logarithm)				
	(a)	(b)	(c)	(d)
FO	**.050515**	**-**	**-**	**-**
head_age	-.03073536	-.05977521	-.035777	-.02616175
head_age_sq	.00020298	.0004795	.00023333	.00012096
head_educa~n	.0150162	.02998469	.00402635	-.00924871
head_liter~y	-.04514394	-.15146652	-.06748475	-.03954098
head_male	-.21827161	-.30582633	-.18863992	-.07374384
head_married	.04258369	-.03666275	-.0923879	-.02740435
head_unemp~d	.12907326	.00328331	.0948527	.02516585
hhsize	.10807929	.02702627	.10167469	.35184545**
hhsize_sq	-.0080796	-.00223159	-.00900953	-.02744395**
pro_dep_ra~o	.04402926	.15891144	.13311572	-.03268791
agri_incom~e	.27960789**	.46027905**	.48683141***	.31978781**
credit	-.2128487*	-.24581031	-.24882195*	-.24537486*
agri_index	-.00813252	.03329413	-.01870257	.0194271

assets_value	.00293713***	.00272682***	.00306055***	.00302993***
assets_val~q	-6.938e-07***	-6.479e-07***	-6.990e-07***	-7.480e-07***
AC	-	**.0272479**	-	-
FA	-	-	**.05930611**	-
FG	-	-	-	**.11420546**
_cons	4.4593021***	5.5034851***	4.5809566***	3.8557812***
N	621	389	414	454
R-squared	0.3705	0.3515	0.4106	0.3917

legend: * p<.1; ** p<.05; *** p<.01