Memot Pepper Market System Analysis

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DISCLAIMER

The contents of this report reflect the views of the consultants who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views of Cambodian Institute for Research and Rural Development (CIRD) and HEKS Cambodia. The consultants bear full liability to what is written in this report. This report does not constitute a standard, specification, or regulation.

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List of Acronym

CD-Custom Declaration

Cm-centimeter

CO-Certificate of Origin

CIRD- Cambodian Institute for Research and Rural Development

COrAA- Cambodian Organic Agriculture Association

DoA- Dsitrict of Agriculture office

DDU-Deliver Duty Unpaid

DGRV- Deutscher Genossenschafts- und Raiffeisen Verband

EU-European Union

FGD-Focus Group Discussion

g-gram

GAP-Good Agriculture Practice

GI-Geographical Indications

GTZ-Gesellschaft Technische Zusammenarbeit (German Technical Cooperation)

ha-hectare

IMIS- Integrated Modern Irrigation Solutions

IPC-International Pepper Community

Kg-Kilogram

L/C-Letter of Credit

l-liter

m-meter

MAFF-Ministry of Agriculture, Fishery and Forestry

Max-Maximum

MFI- Micro Finance Institution

MFIs-Micro Finance Institutions

mg-milligram

min-Minimum

MoC-Ministry of Commerce

MT-Metric Tone

n/a-not available

NGO-Non Government Organization

PDoA-Provincial Department of Agriculture

RGC-Royal Government of Cambodia

SNEC-Supreme National Economics of Cambodia

Executive Summary

CIRD (Cambodian Institute for Research and Rural Development) and HEKS Cambodia NGOs are implementing a project namely "Upgrading Memot Pepper Value Chain for the Benefit of Rural Smallholder Producers in Memot District, Cambodia (MPVC)" funded by a donor in Switzerland. To better design their long term project with M4P approach, the study on Memot pepper market system analysis was conducted to seek better understanding on Memot pepper market system and situation. The study required both quantitative and qualitative data from secondary and primary data. Primary data collection was conducted by three methods: 6 Focused Group Discussion meetings with producers in 6 communes of Memot district; individual interviews with 42 randomly selected producers in the 6 communes; and involved stakeholder interviews with representatives of commune council, district office of agriculture, PDoA, MoC Import Export department, MAFF Industrial Crops department, Input supplier companies, collectors, traders, processors, exporters, retailers, banks, MFIs, transporters, Da Memot cooperative, DGRV donor support to cooperative, and insurance company.

The study found that Memot pepper production has been sharply expanded over the last 3 years. Most of small pepper producers (99%) owning pepper farms less than 1ha have been planting pepper in Memot area. Pepper, one of long crops, became the most profitable crop compared to two main potential crops: cashew nut and cassava. Many farmers who have been investing the crop over several years benefited from the market price which significantly increased from 2 US dollars in 2009 to 9 US dollars in early 2015. Pepper plantation became therefore most suitable crop for small holders because they owned farmland and had other income sources to secure their livelihood. Many new pepper producers including medium and large scale producers have invested in pepper plantation in Memot. Input supplies including fertilizers, pesticide, herbicide, fungicide, plastic pipes, shading materials, irrigation materials and equipment, and machinery have been distributed by several companies. Several banks and

MFIs have been actively provided financial services to pepper producers and traders because loan demand for pepper investment in the area has significantly increased. Approximately 64% of Memot pepper, particularly black peppercorn has been traded formally and illegally cross border to Vietnam; 30% of it to Thailand; 5% of it has consumed locally; and 1% of it was exported to other countries.

Though some positive moves of Memot pepper production and market benefited to pepper producers and other value chain actors, main constraints/challenges were also identified by the study. Limited pepper cultivation techniques, especially small holders has put them in very high risk of getting lower productivity and lost when pepper plants got diseases and spread out to all planted pepper. Most of pepper producers took loan with high Interest rates from local banks and MFIs in Memot for their production by putting their pepper farmland as collateral to loan provider. Small holder producers did not well understand about quality requirements for direct export market because producers used to sell their pepper to local and Vietnamese collectors without drying, cleaning and grading their pepper. Pepper producers in Memot who are not access to pepper market information depended too much on informally export market to Vietnam and Thailand. Only a few registered exporters tried to directly export Memot pepper to international markets. They could not succeed yet their international pepper market due to high export costs (export procedures and documents, transportation and sale tax). However, 25 registered exporters/traders got involved in pepper trading in Cambodia.

To solve above mentioned challenges, following 3 main areas of interventions were recommended: 1- Increase production capacity; 2-Improve pepper quality; and 3-Promote export market.

First recommended project intervention is that pepper producers, particularly small holders are able to increase their pepper productivity if they applied appropriate cultivation innovations: selecting good pepper seeding and variety(ies), using properly quality inputs (fertilizer, herbicide, pesticide, hormone, fungicide, etc.), and taking care of pepper plants such

as weeding, watering, and coping well with pepper diseases. To achieve this, project interventions should work with selected input supplier companies such as Angkor Green and Khy Thay Corporation to provide training on how to use selected fertilizers and other inputs. Input supplier companies would be interested in demonstration of using their products to proof the input's effectiveness and benefit. Involved in disseminating good pepper cultivation practices to pepper producers in Memot, PoDA and DoA technical staff, cooperative members, and input supplier company technical staff could be facilitated to work together by the coming project. Once target producers applied good practices in their pepper production, they are going to benefit from better productivity or income. To expand their plantation, small holders are able to use part of income from pepper plantation and loan funds from bank or MFIs. Acleda bank and Amrith MFI were very active in Memot in providing loan to small pepper producers. Project could find a cooperation way with these two finance institutions to provide better loan interest rate and services to small holders. In other way, facilitating the Rural Development Bank to provide directly loan to Da Memot pepper cooperative would be a good approach for cooperative members to get lower interest rate loan. Da Memot cooperative is a model cooperative providing good saving and credit scheme to their members. Project should consider facilitating establishment of new pepper cooperative which adapt good model of Da Memot cooperative. Activities of new established pepper producer cooperatives could be started from saving and credit among their members. It is recommended that producers who would like to expand their pepper production should be well informed about global trend pepper demand and supply. It means that project staff should constantly provide more reliable price and demand forecast information to all producers.

Second recommended project intervention is that pepper quality and quantity must be improved. However, pepper quality could be also improved by post-harvest activities, mainly focus on pepper drying, cleaning and grading. The more quality requirements of peppercorn complied by producers, the more value added (better price) would be provided by pepper exporters. Project should be able to facilitate pepper exporters to work with pepper cooperatives on basic quality requirements for export market. However, incentives should be

provided to producers to change their traditional practice. For example, additional or premium price of pepper would be given to producers who dry their peppercorn by solar drying system. Facilitating pepper exporters and producers (through cooperatives) to get contract farming or purchase/sale contract is one of strategies to sustain production and supply of Memot pepper. Potential pepper exporter companies: AMRU, Khy Thay, and Kam Spices could be good project partners as they have worked with farmer cooperatives and had good experience of exporting pepper and other agricultural products. Last but not least, SELA Pepper Company invested in pepper processing plant in Memot. Pepper exporters could work with SELA Pepper for cleaning and grading their peppercorn prior to export it. Another potential pepper quality standard for export is organic pepper or free chemical. Though specific demand volume and price were not yet identified by this study, this market does exist and would be a good potential one for some small holders who are interested in pepper organic farming. Kam Spices and Khy Thay Corporation were interesting in exporting organic pepper to market in Europe. Once this market is found, book of specifications for producing organic pepper would be applied and approved by an assigned organic certifier.

The third and last recommended project intervention is that besides its current markets in Vietnam and Thailand through pepper collectors who informally export pepper, direct and formal export markets to consumer countries should be promoted. The project should facilitate established pepper cooperatives to work with potential pepper exporters (AMRU, Khy Thay, and Kam Spices) toward direct export market. Benchmarking Kampot pepper promotion, Memot pepper should be branded for export marketing strategies. Project should facilitate to formulate Memot marketing strategies and implement promotion events in and outside Cambodia with its designed brand logo. A Memot pepper website should be formally developed by pepper cooperatives or union; must be constantly updated information; and linked web page of all business partners including pepper exporters. To better challenge international market, pepper exporters need to be in better cost position. The project should involve the MoC, the department of import and export, and the MAFF, department of industrial crops in weaving procedures, and other related taxes (prepaid sale profit tax). The project may seek to

have synergy with DGRV project in order to get government support to pepper export and promotion. Facilitation of forming Cambodian pepper producer union and Cambodia application for IPC memberships may be the prioritized areas of DGRV project support.

CIRD has a strong experience in implementing promotional strategies for Kampot pepper. The project should be able to benchmark those strategies. 5 key promotional strategies of Memot pepper are recommended as following:

- Creating product label (brand product name, logo, and tag line) is the first important stage before conducting any promotional activities. Project should work with cooperative or pepper producers in Memot or Tboung Khmum province to agree upon the creation of product label with its long term marketing benefit. Product label should be also consulted with key pepper exporters/traders as they may get involved in using it. For long run purpose, project should also facilitate the registration of the branded product label to the Department of intellectual property protection of the MoC to protect the product.

- Organic pepper, free chemical and other standard should be considered if local and export market demand is found. In this case, the project should facilitate exporters/traders to work closely with producers, input suppliers and certification bodies in order to make it happen. Organic standard requires different plantation and processing practices which incur higher cost. Demand volume of organic pepper may be start with small orders but it is a good potential market of pepper for high end market. The more diversified products can be produced and found market, the better competitive advantage of pepper producers.

- Creating and running a website and a facebook of Memot pepper with uploaded short video and constantly updated information are most convenient advertising tools and activities to promote Memot pepper and effectively disseminate information to

producers about production techniques and practices, market information, events, and other useful information such as national and international media reports. Project should facilitate cooperative or association to work closely with input suppliers and exporters/traders who will be interested in advertising their product and business. They will surely share cost and work together effectively. For linking registered pepper exporters to global business network, project should facilitate the companies to register their profile on Alibaba.com. This wide network can benefit them to get potential pepper trading partners in many countries.

- Promotional events such as national/international trade exhibitions and cooking shows/competitions happening should be supported by the project. Memot pepper brand name is effectively promoted within each event. Some events could be partly or fully sponsored by other organizations.

- Every year, farmer leader and line ministry representative are usually invited to international conferences on pepper. Project should be able to facilitate or support their involvement in these important events.

1. Project background and objectives of the market study

CIRD (Cambodian Institute for Research and Rural Development) is a NGO having mission to fighting poverty, to improve the livelihoods of rural communities through capacity building, service and organizational management support enabling rural livelihood systems to improve its position from a subsistence system to an income generating agro-food production and agricultural social enterprises. CIRD works directly with farmer organizations and local communities to provide technical and managerial capacity building and appropriate agricultural technical know-how to ensure that farmer can improve their lives and livelihoods in self-determination.

With the financial support from HEKS, CIRD is implementing a project namely "Upgrading Memot Pepper Value Chain for the Benefit of Rural Smallholder Producers in Memot District, Cambodia (MPVC)". The project target area is in Memot district of TbongKhmum Province where around 90% of the whole Cambodian pepper is produced. The project goal is to increase the incomes and improve the livelihoods of smallholder pepper producers in Memot district. To achieve this goal, the project has 3 specific objectives:

i. Smallholders' pepper production is increased;
ii. The quality of pepper produced by smallholders, is improved and quality pepper price is higher than the conventional one; and
iii. Smallholders' pepper producers have access to a more diversified markets including formal export market.

The main purpose of this study was to collect and analyse all relevant information/data on Memot pepper value chain in order to have a better understanding on Memot pepper market system. The results of this study will be used to improve our existing project intervention design. The main objectives of this study are:

- To understand and analyse the general functioning of pepper market in Cambodia, especially Memot pepper market system (including a value chain mapping for the Memot pepper).
- To understand the present position, roles, relationship and know-how of different actors in Memot pepper value chain, including challenges and opportunities.
- To understand the calculation of cost and benefit for pepper producer, middlemen, processors, exporters ...etc. Particularly, the suitability of cultivating pepper for smallholder producers is to be assessed in detail (capital requirements and endowment, profitability, other asset and skills required, risks involved).
- Identify systemic opportunities and constraints and analyse the enabling environment in the Memot pepper value chain (including production and marketing).

2. Study methodology

Both qualitative and quantitative data are required for this study. Secondary data used were mainly from the report on value chain and market analysis for Memot pepper in 2009 by GTZ&DED, and Pepper Sector Profile in 2012 by Value Chain Unit, Trade Promotion Department, and Ministry of Commerce. These data served for developing a part of this report "overview about current situation of pepper production and trade in Cambodia".

Three data collection methods were employed to gather primary data: key informant interview, individual interview, and focus group discussion of pepper producers. Key informant interview mainly focused on key stakeholders in pepper industry. They were representative of:

- 6 commune council,
- Memot district agriculture office,
- Tboung Khmum PDoA,
- Department of Industrial Crops of MAFF,

- Department of import export of MoC,
- Deutscher Genossenschafts- und Raiffeisen Verband (DGRV),
- DA Memot cooperative,
- Input suppliers: IMIS, Angkor Green, Wathanapich Import Export Company, and CamAgriculture,
- Pepper traders/exporters/processors: Kam Spices, Sela pepper, AMRU rice, Khy Thay Corporation, and OLAM,
- Main collectors(3): Mrs. Touch, Mrs. Samic, and Mrs. Chhay Sor,
- Sub-collector (1): Mrs. Bun Sreynak,
- Bank and MFI: Acleda, Canadia, Amreth and AMK,
- Insurance company: Bassac Insurance Broker: Ms. Seng Someak

For more details, please refer to below Annex 1: list of interviewed key stakeholders.

In addition, 6 focus group discussion of farmer representatives were organized within 6 target study communes: Da, Memot, Treak, Tramoung, Korki, and Tunloung. The summary of FGD participants can be viewed on below Annex 2- FGD participant summary.

Last method is individual interview with 42 pepper producers. The table below shows the producers were identified for interview.

No	Name of commune	Number of pepper production villages	Number of village selected for the study	Number of respondents
1	Da	13	3	9
2	Memot	12	3	9
3	Tunlong	8	2	6
4	Treak	7	2	6
5	Tramoung	5	2	6
6	Korki	5	2	6
	Total	**50**	**14**	**42**

The interviewed producers in villages of Memot, Korki, and Tramoung communes were randomly selected on the list provided by the commune chief. However, interviewed producers

in villages of Tunloung, Da, and Treak communes were randomly selected through transect walk in those villages. List of interviewed farmers is enclosed in the Annex 3.

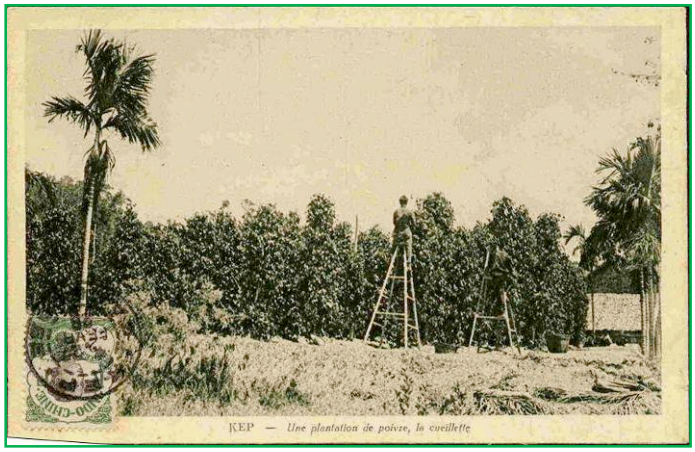
Each data collection method required its tool which is unstructured or semi-structured questionnaire. The designed questionnaires are also enclosed in Annex 4.

3. Scope and Limitations

Due to limited time and resource, the study team could meet with all types of key actors of the value chain but could not meet with all actors within target areas. Only 42 pepper producers were interviewed, this is not a big sample size, thus we used qualitative semi-structure method. Some pepper collectors and traders did not disclose some important information as they protected their trade secrets. Data collected however are quite enough for study analysis.

4. Main findings

4.1 Overview on pepper production in Cambodia



Black pepper (*Piper nigrum*) is a climbing vine, its fruit usually dried and used as a spice and seasoning. Cultivation in Cambodia may go back more than a thousand years (Benezech J. for Farmlink 2007, "Kampot Pepper -- An exceptional product -- The revival of an industry,"), as there is evidence of pepper during the Angkor civilization. Planting conditions were favourable, with cultivation likely starting in the late 18th century. Production shifted to Kampot as a result of destruction of Indonesian plantations by the Sultan of Aceh to keep them out of

Dutch hands. Production scaled up to industrial levels in the 1890's for the French market, reaching 8, 000 tons per year in the early 1900's. French consumption cut in half during the First World War, production increased with Cambodia's independence in 1953, then dropped in the 1950's to 3,000 tons per year. Production ceased entirely under the Khmer Rouge, and most poles were destroyed. Production started up again in the late 1990s's, but again dropped when global pepper prices collapsed in 2000.

Pepper is a branching perennial vine that is restricted to about 4 meters in height in Cambodia, and is grown mainly in the red-soil provinces and coastal areas. Pepper requires a long rainy season (over 2,000mm annually), fairly high temperatures (20-40°C) and partial shade, and grows best in coastal areas or at elevations lower than 1,200m (www.practicalaction.org). Pepper is planted during the wet season from June to August. In Cambodia, it starts bearing fruits after about 2 years, it takes 6 to 8 months from flowering to harvest. The pepper vine may produce fruits for as long as 30 to 40 years.

According to pepper sector profile in 2010 by Value Chain Unit, Trade Promotion Department Ministry of Commerce, the total pepper production increased from 60 metric tons in 2000 to 861 metric tons in 2010. In 2000, pepper was produced only in two provinces: Kampot and Mondulkiri. In 2010, the production was expanded to nine provinces: Kampong Cham, Kampot, Koh Kong, Kratie, Kep, Preah Sihanouk, Mondulkiri, Battambang, Ratanakiri, Siem Reap, Takeo, Kampong Thom, Pursat, and Stung Treng. Though the increase of pepper production in Cambodia, IPC did not yet classified Cambodia as one of pepper production countries (members and non-member).

Recent pepper production data provided by the Department of Industrial Crops of MAFF are presented on the below table:

Table 1: Last three year pepper production in Cambodia

No	Province	Total cultivation area (ha)			Total harvesting area (ha)			Total yearly production (MT)		
		2012	**2013**	**2014**	**2012**	**2013**	**2014**	**2012**	**2013**	**2014**
1	Kampong Cham	1,159	1,416	74	682	798		4,770	4,915	
2	Tboung Khmum	-	-	2,719	-	-	1,166			8,162
3	Koh Kong	102	102	118	51	51	51	128	128	128
4	Ratanakiri	73	126	407	30	40	103	177	177	289
5	Kratie	26	91	452	18	57	87	126	126	600
6	Mondulkiri	16	139	235	16	19	23	72	72	61
7	Preah Sihanouk	23	23	61	23	23	17	68	68	68
8	Battambang	20	22	34	15	11	16	45	38	45
9	Kampot	15	90	125	50	26	29	38	40**	46
10	Takeo	8	29	20	8	11	20	38	38	30
11	Kep	2	84	90	2	3	5	4	10	6
12	Preah Vihear	-	34	41	-	-	-			
13	Siem Reap	-	2	76	-	-	-			
14	Pursat	-	40	105	-	-	22			88
15	Kampong Thom	-	14	62	-	13	-			2
16	Otdar Meanchey	-	8	8	-	-	-			1
17	Stung Treng	-	8	8	-	-	5			13
18	Kampong Speu	-	10	10	-	-	-			1.5
Total		**1,444**	**2,238**	**4,645**	**985**	**1,052**	**1,544**	**5,465**	**5,611**	**9,541**

***Estimated total production in 2013: 26hax1.58MT/ha (average yield quoted from KPPA:1.58MT/ha).*

Above table shows that pepper production areas were expanded from 11 provinces in 2011-2012 to 18 provinces in 2013-2014. The cultivation areas also increased from 1,444 ha in 2012 to 4,645 ha in 2014 (triple in 2 years) while the production increased from 5,465 to 9,541 metric tons per year (almost double). The majority of pepper production is in Tboung Khmum

province[1] where about 8,162[2] metric tons (85%) was produced in 2014. According to recent data from the Memot district agriculture office, Memot district of Tboung Khmum is the largest pepper production areas in the country. In early 2015, pepper cultivation area in Memot was 2,219 ha while harvesting areas was 1,237 ha.

Table 2 below shows that more than 5,400 farmers in 6 studied communes of Memot planted over 2,300 ha of their pepper farm. It means that the average size of pepper farm was 0.43 ha per producer. According to the updated list of pepper producers provided by 3 communes, only around 1% of producers had pepper farms from 1 to 5 hectares. This means that the majority of pepper small holders have invested in the crop. Average size of pepper farm in Tramoung and Memot communes seemed higher than other communes. Pepper farm size in Treak commune was even smallest in the area.

Table 2: Number of pepper producers in study communes and average size of pepper farms

No	Name of commune	Planted area (ha)	Harvested area (ha)	Number of producers	Average size of pepper farm (ha/family)
1	Da	1,200	1,000	3,150	0.38
2	Memot	469	347	749	0.63
3	Treak	88	60	661	0.13
4	Tramoung	400	200	470	0.85
5	Tunloung	100	20	215	0.47
6	Korki	70	47	185	0.38
Total		**2,327**	**1,654**	**5,430**	**0.43**

Source: *commune data from commune chief in 2015*

[1] This province was newly set up in 2014 and took parts of Kampong Cham province

[2] This data was potential yearly yield excluded losses due to diseases and climate.

Dominant varieties of pepper planted in Cambodia are Khmer and Indian varieties. Vietnamese variety came during late 2000's. Until recently, a few new pepper varieties: Ceylon Preah Viheah (a variety imported from Srilanka by CamAgriculture Import Export Ltd), Ceylon varieties from Thailand, and two other varieties named locally "Malay" varieties. These new varieties have been introduced recently to pepper producers. Farmers replicate however pepper seedling from farmers to farmers and spread over throughout the country.

Generally, farmers have to irrigate pepper during the dry season from early December to April. Direct sun light can also damage pepper vine. Farmers have put sun light barriers (coco nut leaves or plastic net) to reduce direct hitting especially when pepper vine is newly grown. Most of the farmers using ground water for irrigate pepper. Medium and large scale pepper producers started using drip or sprinkler irrigation system for watering their plantation.

Some farmers do not harvest pepper at the first harvest time. They plug pepper flowers, and keep pepper vine grow strongly and healthily. To gain higher productivity, farmers use more inputs without understand of input application rate for pepper in conjunction with soil condition and economical return rate from usage of inputs. Farmers use cow manure as a natural fertilizers for covering top soil and they use chemical fertilizers (15-15-15) and (20-20-15) for adding nutrition to the pepper plant during first stage of flowering stage, and they are top dressing with chemical liquid fertilizers (60-80-0) to strengthening flowers and buds. Likewise fertilizers, pesticides have been applied without recording of application rate; when pest infested farmers just apply pesticides unknowingly to kill insects or pests. Many imported pesticides, herbicides, and hormone were quite available in Memot area. However, some of their packaging was

written in foreign languages (Vietnamese and Thai) that farmers do not understand how to properly use and store its residuals after application.

In Cambodia, pepper harvest period is from January to May. The Khmer variety pepper is usually harvested from March to May. Indian variety pepper is harvested from December to early February. Many pepper producers have been planting the two varieties on their farmland. Generally, Cambodian farmers dry harvested peppercorn by sunlight. Sometimes they find hard to have sun light for drying pepper. The duration of drying is 3 to 5 days until they sense or visual test shown that pepper is dried enough for storage. Most of the farmers were aware that improper drying of pepper before storage, causes fungi or rotten the peppercorns.

4.1.1 Small holders production system, appropriateness and its comparative advantage

Within this study, farmers who planted from 50 poles to 2,000 poles are considered as small-scale farmers. For pepper producers who owned between 1 and 5 hectares of pepper farm are considered as medium and for those who have more than 5 hectares of pepper farm, are considered as large-scale farmers. Base on these criteria, the study result shows that the majority of pepper producers in Memot (99%), are stallholder producers with an average of 0.43 ha of pepper farm per family (see the table 2 above). Among several reasons why small-scale farmers invest in pepper production, four main reasons are identified and described within following sections.

i. **Soil and climate conditions:** red soil fertility, favorable soil structure, land shape, rainfall and weather in Memot provide pepper plant to grow fast and provide good yield to farmers. Event though they are small-scale farmers but they own their farmland that is suitable for pepper plantation, no need big capital to rent or buy land.

ii. **Increased price of pepper and its best cash return:** Compared to cashew nut, rubber and cassava, since last 5-6 years pepper has been the best perennial crop providing better cash return and net profit than other crops. The table 3 below showed that cash return and net profit from cassava and cashew nut were much less than from pepper because the price of pepper has increased from 2 US dollars in 2009 to 9 US dollars in 2015.

Table 3: Comparison of cash return and net profit from 3 main crops

Crop	Average yield per hectare (kg)	Price ($/Kg)	Cash return ($/ha)	Net profit ($/ha)
Cashew nut	1,000[3]	1[4]	1,000	530[5]
Cassava[6]	20,000	0.0871	1,742	977
Pepper[7]	4,500	9	40,500	21,150

Sources: *cashew nut and cassava data from most recent study reports with footnotes and pepper data from this study.*

iii. **Geographical location near pepper market:** Memot district has long bordering areas with Vietnam where pepper production is. Vietnam is the first pepper exporter country in the world. Peppercorn becomes a great demand of big pepper processors and exporters based in Vietnam.

iv. **Affordable investment and production costs and access to finance:** Small pepper producers were able to invest pepper plantation from 50 poles on their existing farm land. Majority of small pepper farmers survived income from other crops and business activities. Results of interviewing 42 farmers in the 6 communes confirmed

[3] *Prospects for Cambodia's Cashew Sub-sector, International Finance Corporation, European Union, 2010*
[4] *http://www.khmertimeskh.com/news/13835/farmers-try-to-cash-in-on-cashews/*
[5] *Cambodia's export diversification and value addition, CHAN Vuthy, EIC Researcher, July 11, 2007*
[6] *Cassava value chain analysis inclusive business model for promoting sustainable smallholder cassava production, (IBC), SNV2014*
[7] *data from this study*

that currently 29% of farmers mainly depend on pepper production. It was clear that pepper was not the main income for pepper producers since they secured their income from rice, cassava, rubber plantation, durian plantation, and other off-farm businesses. However, farmers' livelihood strategy is to invest in pepper production step by step at their own investment capacity as they consider pepper will become their main source of family income in the near future. Pepper farm investment has been considered as a strategy for their long term investment. Strategically, farmers invested in pepper farm from their majority of own funds with additional loan from bank and microfinance institutions. Pepper farmland in Memot become very expensive thanked to the increased price of peppercorn. MFIs and banks accepted pepper farmland and pepper plantation as good valued collateral for loan. With their pepper farmland, pepper smallholders were able to invest in the pepper. With great demand of pepper seeding (planting material) by new farmers, pepper small holders were able to secure income from selling pepper seeding for bank or MFI interest expenses and following year operational costs. At the period of study, 4 of 12 communes in Memot (Mei Moung, Tunloung, Korki and Cham Kravien), has registered land title and the same processes would happen to other 8 communes.

To better understand how production system has been adapted by small pepper producers, the following sections from a. to j. provide more detailed information about it.

a. Preparation of the land

Most of small farmers, especially in Memot, were renting an excavator and bulldozer for preparing their pepper farmland. In the past, small farmers invest their manual labor and equipment for preparing it. The new practice makes them less time and cost. For a plot of 20mx20m, it cost them between 140,000 - 150,000 Riels (or around 900 US$/ha) while they used to spent about 1,200 US$/ha for that job in the past. Mechanization usage is a key advantage for farmers in Memot and other areas to well soften soil for long run pepper production.

b. Installation of poles

Most farmers use high quality wooden poles as support for pepper to grow, which are about 4 meters high and 15 cm in diameter and cost 5 – 6 US dollar per pole. The poles require a hole of 60-70 cm in depth. The space between poles ranges from 2.3 m to 2.5 m depending on the soil quality. In general, one hectare of pepper farm in Memot required 1,800 to 2,000 wooden poles which last long up to 12 years. At the moment, wooden poles become more and more expensive due to demand increasing every year, especially during plantation season from June to August. Recently, a few farmers in Memot started importing paulownia tree seedlings from Vietnam and planting them for pepper live support.

c. Selection of seedlings

Different pepper vine varieties have been cultivated in Cambodia. In Memot, farmers cultivated mainly the local variety ("Mrech Bay") which is popular thanks to its high and stable yield. Farmers also tried other varieties ("Julaen") from Vietnam, "India" variety, Ceylon varieties from Sri Lanka and Thailand, and "Malay" variety. Farmers typically cut the stems of their own plants that are older than 12 months ("propagation") or buy stems from other farmers. One seedling was sold at 1 US dollars. Small-scale farmers usually prefer to keep their seedlings for themselves for expansion. However, small farmers in Memot often sell their first year pepper seedlings to secure their income for next year operational expenses. Some farmers even sell their second year pepper seedlings if they do not have good plan of expanding production. By doing this, small farmers were able to settle their financial situation. The first harvest for their pepper was at the third year.

d. Irrigation

Young seedlings need water if there is no rain during the whole day. In last few years, small farmers in Memot have been accessible to modern drip or sprinkler irrigation system while they were using pumping system and manual watering system. In Memot, many small farmers now started using modern irrigation system so that they could manage pepper farm more effectively and efficiently. However, some small farmers, particularly those were new producers, could not invest sprinkler or drip irrigation system which cost them between 2.50-3.00UD dollars per pole. They were still using pumping and manual watering system.

e. Creation of shades

Pepper seedlings must be protected from excessive and direct sunlight for best growth, in particular during their first year. In Memot, farmers build a shade structure (roof and wall) around the new plantation, usually from coconut stalks. These coconut stalks however became rare and expensive. Over recent years, plastic net have been available at affordable price, many farmers started using it instead.

f. Fertilization

Pepper producers in Kampot and Koh Kong provinces have been using organic fertilizer for their production as they comply with GI and organic production specifications. In Memot areas, pepper producers have been using two types of fertilizers: organic and chemical ones. They use cow manure as organic source and NPK15-15-15. Pepper producers in Memot have been using chemical fertilizer to increase yield as peppercorn quality was still accepted by both market in Vietnam and Thailand. However, level of chemical input was not very intensive as they are using much more organic fertilizer from cow manure and imported fertilizers.

g. Weeding

In Memot, weeding is generally carried out once per month during the rainy season, in particular from June to September. It is done manually 4 to 5 times per year. Small farmers do this activity without cost by their family members. However, they can hire seasonal workers to do it instead with a cost of 500Riels/pole/time.

h. Applying pesticides

Farmers in Memot and other areas apply pesticides (herbicides, insecticides, fungicides) 3 to 10 months after planting, two times per month during 5 to 6 months.

i. Harvesting

Farmers can harvest peppercorn from the new plant from 18 to 24 months after planting. Peppercorns can be harvested at various stages of maturity as they ripen from green to red. The flavour and pungency of pepper develop as the berries ripen and mature. In general, the whole spikes of berries are picked by hand when one or two berries begin to turn orange. This manual harvesting is a much more time-consuming and repetitive activity, but allows reaping more red pepper. Pepper harvesting period is from January to May.

j. Drying

After harvest, peppers are put in bamboo buckets and carry home for drying. The Drying are done by sun dry, there is no solar drying or other technology. Sometime farmers find hard to have sun light for drying pepper. The duration of drying is 3 to 5 days until they sense or visual test shown that pepper is dried enough for storage. Most of the farmers are aware that improper drying of pepper before storage, causes fungi or rotten the peppercorns.

Pepper berries must be dried until they are black and wrinkled and have moisture content between 12%-13.5% to prevent the growth of mould. Farmers in Memot dried fresh in the sun for 3-4 days to obtain favorable moisture content. Farmers did not improve yet their drying technique to comply with sanitation standard.

From farming situational and market opportunity analysis above, pepper plantation attract small and large scale producers. This pepper production started in Memot during 1980's. Some farmers in Memot experienced and considered as a potential long crop which can provide high income among other crops. Small holders therefore could start a small plantation with their own farmland and funds. They can expand their plantation areas from income they generated from pepper.

Comparing advantages and disadvantages of small and big holders within following section will proof that pepper is suitable crop small holders in Memot.

4.1.2 Medium holder production system

Medium holder here refers to those who have pepper production farm size bigger then 1 ha up to 5 ha. So far some small-scale pepper producers in Memot have benefited the increase of

pepper price from 2 US$ in 2009 to 9 US$ in 2015 and have upgraded their production capacity from small to medium scale producers. However, some new investors and companies have been investing their money in the pepper plantation in Memot and other areas. Some local farmers shifted their focus crops such as rubber to pepper plantation as they own land suitable for pepper plantation.

Small scale and medium scale production systems are adapting to similar production steps /processes mentioned on the section 4.1.1 from a. to j. The differences between small holder and medium holder systems were mainly associated with scale of investment, financial sources, labor use, and techniques. The table 4 below provides a comparison of advantages of the small and medium holder systems.

Table 4: Comparison of advantages and disadvantages of the small and medium holder systems

Production steps/aspects	Smallholder	Medium holder
Initial investment, land and fund sources	– Own small piece of land – Some farmers sold some piece of their land for getting money to invest in pepper production – Limited own funds for initial investment funds – Income from pepper production and other businesses is still low.	– Own large piece of land for pepper production – Some buy new farm for pepper production – More own funds for initial investment. – Income from pepper production and other businesses are higher.
Preparation of the land	– Some producers rent excavator and bulldozer for preparing land for pepper production	– Almost all producers rent excavator and bulldozer for preparing land for pepper production

Production steps/aspects	Smallholder	Medium holder
	– Some producers still do it manually.	
Installation of poles	– Due to financial constrain, producers could buy pepper poles during pepper harvest period. During this time the price of pepper poles, is more expensive due to higher demand (farmers could sell their peppercorns thus can have money to expand pepper plantation). – Due to limited farm size, small farmers tend to install poles with distance from 2 m to 2.3 m. New small farmers usually do all activities of initial investment by themselves.	– Buying poles with huge quantity and at any time, often could get better price – Normally, investors tend to choose larger distance of pepper pole: from 2.3 m to 2.8 m as they like to work with tractors for weeding and fertilization. – New big holders usually pay lump sum initial investment to a local service provider for land preparation, installation of poles, and planting seeding.
Irrigation	– Some small farmers having pepper plantations in harvesting age could make money from selling peppercorns like to invest in modern irrigation system such as drip and sprinkler system.	– Farmers use modern irrigation system (sprinkler or drip irrigation system)

Production steps/aspects	Smallholder	Medium holder
	– For those having pepper plantations that are not yet in harvesting age, (new farmers) tend to simply install pumping machines and use plastic tube for watering manually.	
Weeding	– Use own labor or limited use of employed workers.	– Employed own permanent staff to weed by tractors/machine.
Pest and disease control	– Farmers apply pesticides (herbicides, insecticides, fungicides) by employing workers or outsourcing this activity. – New and small farmers may have limited knowledge and experience of using the chemical substances bought locally. – Small holder take care of individual pepper pole well because small farm size and their direct involvement.	– Farmers apply pesticides (herbicides, insecticides, and fungicides by own employed permanent workers. – Farmers or employed staff may have better access to technical knowledge in handling this activity. – Because of big farm size, level of taking care of individual pepper pole cannot be done well enough as they hire staff to do it.
Harvesting	– Limit use of seasonal workers as family members are got involved. Thus, in	– Hire seasonal workers who migrate from other province, some do not have

Production steps/aspects	Smallholder	Medium holder
	general the quality of pepper harvested is generally better because they are experienced and they take better attention on their own products. – Small holders could not find seasonal workers easily because they have short period of harvest.	experience in this work or just start working on this. – Big holders could find seasonal workers easily because their harvest period is usually longer- from January to May. Generally, they harvested Indian variety first and later Khmer variety.

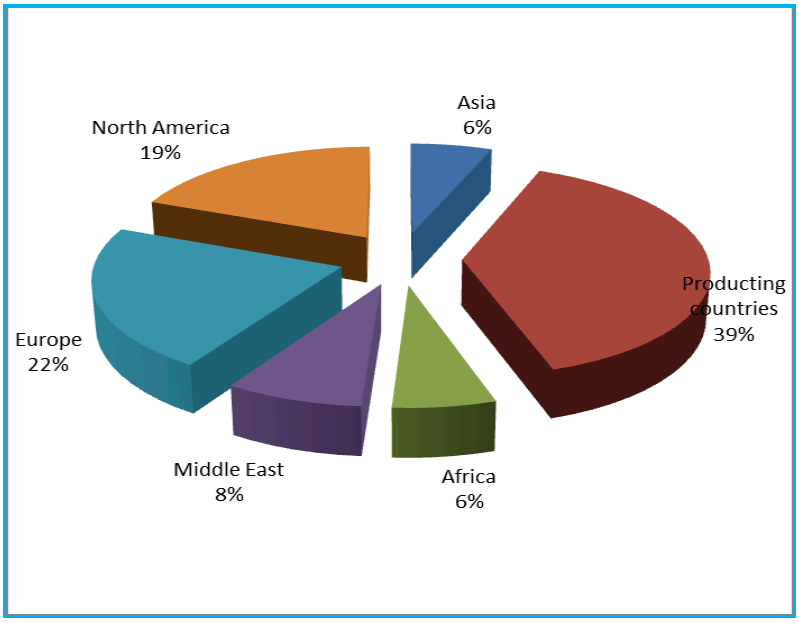
Advantages and disadvantages of small holders analyzed on above table proof that pepper can be invested by small holders. Small holders could start small farm size with own land and own funds available. They could expand it from time to time, step by step when they could make money from the previous plantation. Furthermore, different from rice, cassava and some other plantation crops, pepper plants need regular and intensive crop maintenance by experienced farmer. This can be applied only with smallholders who employ their own families' labor who pay good attention on their own farm and can gain more and more experiences over the years. Medium and big holders need to hire labor from outside who often pay less attention on pepper plant, if compared with farm owner.

4.2 Overview pepper world production and demand

The main pepper producing countries are Vietnam, India, Indonesia, Brazil, Malaysia, China and Sri Lanka. Other producing countries are Cambodia, Thailand, Philippines, Madagascar, Ghana,

Rwanda, Mexico, and Ecuador[8]. According to NEDSPICE Pepper Crop Report 2015, the total global consumption of pepper in 2014 was 398,000 tons of which 39% consumed by producing countries, 6% by countries in Asia, 6% in Africa, 8% in Middle East, 22% in Europe, and 19% in North America(figure 1 below).

Figure 1: Breakdown of global consumption by region



Source: *NEDSPICE pepper crop report 2015*

The table 5 below provides detailed information of world pepper production from 2011 to 2014. It seems that all producing countries (except Brazil and China) have significantly increased their production volume since 2011. The global production volume increased from 328,141 tons in 2011 to 409, 000 tons in 2014.

[8] *Data of FAO and IPC in 2010*

Table 5: Global production volume of pepper (2011-2014)

No	Producing countries	Yearly production volume (MT)			
		2011	2012	2013	2014
1	Indonesia	25,000	72,000	47,000	60,000
2	Vietnam	125,000	142,000	145,000	155,000
3	Brazil	37,641	39,000	39,000	39,000
4	India	50,000	50,000	54,000	45,000
5	Malaysia	16,000	16,000	23,000	23,000
6	China	39,000	34,000	35,000	37,000
7	Sri Lanka	15,000	17,655	23,000	24,000
8	Others	20,500	22,000	24,000	26,000
Total		**328,141**	**392,655**	**390,000**	**409,000**

Source: *NEDSPICE pepper crop reports 2012/2013/2014/2015*

*Table 6**: Global production and global consumption of pepper (2011-2014)***

Pepper supply and demand	Volume (MT)			
	2011	2012	2013	2014
Production	328,141	392,655	390,000	409,000
Consumption	350,000	360,000	393,000	398,000
Shortage/Surplus	(21,859)	32,655	(3,000)	11,000

Source: *NEDSPICE pepper crop reports 2012/2013/2014/2015*

Data presented on table 6 above translates that global production and consumption become nearly matched. If significant production volume increases for coming years, a huge surplus will happen and pepper market would be saturated.

Based on their data and estimated total pepper produced during early 2016, NEDSPICE predicted that a surplus of approx. 8,000 tons. However, their forecast was made by assuming that global production volume and global consumption would increase as projected.

4.3 Overview on pepper market in Cambodia

Pepper becomes the “Top Ten Products” in five provinces: TbongKhmum, Kampot, Kep, Kratie, and Sihanoukville. The Value Chain and Market Analysis for Memot pepper of GTZ in 2009

estimated a total of 4,000 metric tons of pepper produced in Cambodia during harvest season 2008-2009. As mentioned on section 4.1 above, pepper production increased to a total of 9,541 metric tons in 2014. Pepper production in Tboung Khmum (or mainly in Memot district) represented 86% of total production. According to recent report of Kampot Pepper Promotion Association (KAPPA), Kampot pepper 22.42 metric tons were exported under Geographical Indication product to European countries, Norway, USA, Japan and Australia by six companies: Farmlink, Senteur d'Angkor, Confirel, Bright Starling, Indochin Spice, and Japan Spice. Since 2009, Kampot Pepper has been well-known as its GI protected product by Intellectual Properties law of the Ministry of Commerce, and classified as one of the finest pepper in the world. Kampot pepper has been also locally traded in Cambodia for high end and tourist markets.

According to MAFF pepper export data, Cambodia formally exported pepper of 679 MT in 2013 to France, Germany, Switzerland, Canada, Malaysia, Japan, Korea and Vietnam. In 2014, 1,154 MT of pepper was exported to France, Germany, Denmark, Mexico, Netherlands, Taiwan, and Vietnam. Pepper export data on table 7 below were officially provided by the Department of Export Import, General Directorate of Trade Support Service, of the Ministry of Commerce.

Table 7: Cambodian pepper export data 2012-2015

No	Countries importing pepper from Cambodia	Volume by year (MT)			
		2012	2013	2014	2015 (6months)
1	EU countries	6.47	7.37	63.33	6.95
2	Australia	0.15	0	0	0
3	Japan	2.94	15.89	1.61	0
4	Korea	0.6	0	0	3.07
5	Thailand	50	N/A	N/A	N/A
6	Chinese Taipei	0	0	28.22	0
7	Vietnam	N/A	N/A	300.00	500.10
Total		**60.16**	**23.26**	**393.16**	**510.12**

Source: *the Department of Export Import, General Directorate of Trade Support Service, Ministry of Commerce, September 2015.*

Based on export data in 2014, about 393.16 metric tons of pepper was exported officially from Cambodia. The amount of pepper local consumption was estimated at 500 metric tons per year[9]. These meant that approximately 8,470 metric tons of peppers were smuggled to Vietnam and Thailand. The smuggling has been happening since the start of pepper production in the country and was even mentioned by the Value Chain and Market Analysis for Memot pepper of GTZ in 2009. Like other agriculture crops, pepper could not find its direct export markets in the country and has been traded across border to Vietnam and Thailand where many processors and exporters have been working together for their local and world markets.

Results of this study showed that about 64% or 5,800 MT of pepper found market in Vietnam, 5% or 450 MT found market in the country, 30% or 2,700 MT found market in Thailand, and 1% or 90 MT found market in Australia, USA, Japan, Korea and European countries to which exporters in Cambodia officially proceeded their export procedures.

The average market price of black peppercorn at period of this study was about 9 US dollars per kilogram which was already at or slightly higher than market price in Vietnam. The price has

[9] *NEDSPICE 2014 annual meeting report estimated global consumption rate was at 35grams/capita)*

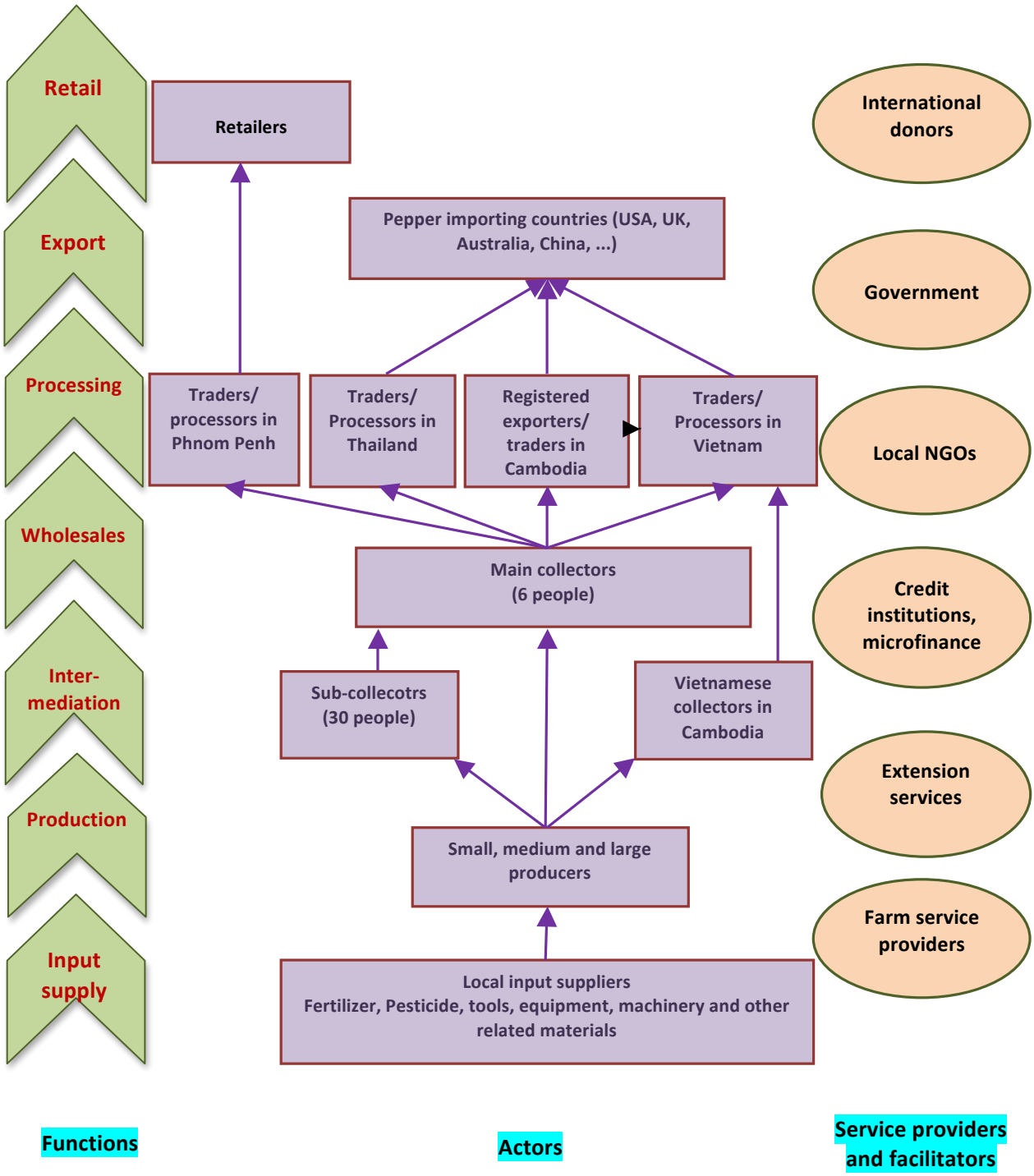
significantly increased over the last 6 years. One kilogram of black pepper corn was about 2 US dollars in 2009.

4.4 Current Memot pepper market system (functions, roles, relationship and know-how of different actors in Memot pepper value chain)

4.3.1. Memot pepper market

Like other agricultural products, Memot pepper market structure was from producer to end consumer, which presented on figure 1. Pepper produced in Memot and nearby areas has been mainly sold to its first market layer: Vietnamese collectors (who come to buy pepper during harvest period), Cambodian sub-collectors and main collectors/traders. The second layer is pepper processors/traders in Vietnam and Thailand, registered exporters in Cambodia, and traders/processors in Phnom Penh. Pepper has found about 64% of total market in Vietnam, 30% in Thailand, 5% in the country (consumption and tourist market), and 1% in pepper consumers countries- Australia, Japan, Korea, Taiwan, USA, and some European countries.

Figure 2: Pepper market flowchart and system



4.3.2. Current Memot market system (function, role and relationship)

Figure 2 above presents overall picture of Memot pepper market system while the table 8 below lists main value chain actors with their specific activities.

Table 8: main value chain actors in Memot and their activities

	Equipment, material and Input supply	Cultivation	Collection/trading	Processing	Exporting/ Distributing
Activities	Supply inputs: • Wooden poles • Coconut leaves (for shades) • Seedlings • Fertilizer • Pesticides (Herbicides, Insecticides, Fungicides) • irrigated equipment and materials • Machinery / tools and equipment	• Preparation of land • Installation of poles • Creation of shades • Selection of seedlings • Planting • Irrigation • Fertilizing • Weeding • Applying pesticides • Harvesting • Removing and sorting the berries • Drying • Storage	• Collection • Quality assessment • Re-drying • Grading • Packaging • Storage • Transportation • Selling	• Transforming black pepper to white and red pepper • Grinding to pepper powder • Packaging and labeling • Storage	• Distribution • Exporting
Value Chain Actors	• Local input suppliers • Da Memot cooperative • Shops selling fertilizer, pesticide, herbicide and Fungicides • Companies installing irrigation system • Shops selling	• Small, Medium and Large scale farmers	• Sub-collectors • Main collectors • Vietnamese collectors • Vietnam traders	• Traders/ Processors in Phnom Penh. • Traders/Processors in Thailand and Vietnam	• Distributors in Phnom Penh • Registered exporters in Cambodia

	Equipment, material and Input supply	Cultivation	Collection/trading	Processing	Exporting/ Distributing
	shading materials, plastic tubes and accessories, machinery and equipment for pepper farms				

Overall activities of each value chain actors from above table are described below:

- **Provision of equipment, materials and inputs:** normally equipment, materials and inputs are wooden poles, coconut leaves, wire, plastic net, seedlings, fertilizers, pesticides, herbicides, irrigated tube and valves, other tools and equipment. Software input is pepper production knowledge which mostly shared among farmers.
- **Cultivation:** all steps and processes of planting and taking care of pepper seeding until pepper corns can be harvested. Pepper producers should combine their efforts and technical knowledge to get productivity of pepper at each harvest period.
- **Collection and trading:** farmers usually sell their dry peppercorn to collectors who come to their door or to main collectors in commune or district level. Traders/exporters who buy pepper from collectors for their export (to mainly Viet Nam and Thailand) or sell it in Phnom Penh.
- **Processing:** pepper producers, especially small holders get involved in harvest and post-harvest activities including harvesting pepper berries from the stems, drying berries until black, wrinkled and it dried enough, grading peppercorn, grounding pepper, packaging and storing peppercorns. Grinding peppercorn and transforming pepper to red and white pepper are done by pepper traders and processors.

- **Exporting/Distributing:** this involves in selling peppercorns in either national or international market.

To understand better the current Memot market system (function, role and relationship), the following sections from A to M provide more information about main value chain actors and other stakeholders who have been involved in Memot pepper.

A. Input suppliers (Pesticide, herbicide, and hormone)

Many companies has imported and sold pesticides, herbicides and hormone in Memot district. Some companies have their dealers as shops in Memot, some sold to Da Memot cooperative. Other materials such as spraying tanks, plastic net, tools, equipment and machinery were quite available in the areas. Besides wooden poles and coconut leaves, the above mentioned products have been legally and illegally imported. All products have been competed with Vietnamese products which were illegally imported through border (Memot border). Those products are mainly pesticide, herbicide, and hormone are in Vietnamese language. It is hard therefore for farmers to understand the proper application rate and time although shop owners have been guided by Vietnamese input traders. According to interview with farmers, it seems that most of farmers are verbally instructed by the sellers when buying those products. However, almost farmers did not know how to properly keep empty containers and packages for their health safety and environment because they were not aware of its bad effects. All input suppliers companies have been promoting their products to pepper producers. With limited technical support from pepper experts, pepper producers had to learn the input usage from their neighbors, friends and other farmers in the community. Some farmers have made own experiments from year to year to find out right inputs that suitable for their crops production.

Fertilizers

According to the interview with farmers, it seems that most of farmers have been using cow manure as a source of inputs to improve soil conditions. A few organic fertilizers have been sold to pepper producers. The study team interviewed a few importers: Wathanapich Import Export Company (granulated organic fertilizers from Belgium), Angkor Green (chemical granulated and liquid fertilizers as well as pesticide and fungicide from China, organic fungicide from India), CamAgriculture (powder fertilizer, pesticide, fungicide and hormone from Israel).

Since great demand of cow manure for pepper and other crops, cow manure became rarer and expensive. Farmers therefore shifted to use granulated imported organic fertilizers or organic liquid such as Effective Microorganism (EM). Farmers have been using imported NPK15-15-15, NPK20-20-15, and liquid (60-80-0) at different stages to get better flower, bud and productivity.

Similar to pesticide, herbicide, fungicide and hormone, fertilizers (organic and non-organic) have been promoted among pepper producers by local importers. This study found that most of input suppliers had limited technical support (services other than selling products) to producers. It seem that the Angkor Green company hired a few technical staff to provide services to pepper producers as they have provided a wide range of inputs, materials and equipment. No fertilizing good practice was however studied and disseminated by any company or line agriculture department to farmers.

Seedling

Pepper seedlings have been traded from farmers to farmers. For the Khmer and Julaen (Vietnamese) variety, it costs about 1USD per seedling at farmer's gate. Generally, farmers need 2-3 seedlings per pole or 3,600 to 4,000 seedlings per hectare. Seeding of Indian and other varieties costs about 2-5 USD per seedlings. Interviews with pepper producers showed that most of them, especially smallholder have planted Khmer variety because many farmers had strong production experience and it also provide good yield. Market demand of Khmer pepper was also one of main reasons of investing and expanding pepper in Memot.

Medium and large scale farmers have been recently diversified other varieties because they have made profit and have to try new varieties for better productivity. However, the study did not investigate if new varieties were suitable for farmers in Memot.

Poles and coconut leaf

Farmers have been using high quality wooden poles for many years as they would like to have strong support of pepper vine, more branches to have much pepper corns. More importantly high quality pole lasts long (at least 10 year life) and is very resistant to insect, termites, and rotten. Wooden pole became more and more expensive (5-6USD/pole), particularly during planting season from June to August. Live support was not yet used by producers in Memot. A farmer in Memot imported from Vietnam and sold paulownia tree seeding to other farmers in other

provinces such as Kampong Cham and Kratie. He planted a thousand paulownia trees in his new pepper farm. It may take times to demonstrate how benefit of using such live pole to farmers in Memot.

To shade the planted pepper seedlings until one year, farmers usually use coconut leaves. The leaves have been imported from Kratie and parts of Kampong Cham provinces. Since the leaves were rare, farmers chose to use more and more plastic net. This cost them a lot and it is suitable for medium and large scale pepper production. Small farmers however were still using coconut leaves as shading materials.

Irrigation system

Many small farmers using water from well and stream, especially new small farmers did not afford to install drip or sprinkler system. They were still using manual watering system-spraying pepper plants by operated manual valve from plastic water pipe. The manual system requires more labor inputs, waste of water resource, pumping cost and spreading diseases.

However, some small farmers who earned enough fund started investing the modern irrigation system. Medium and large scale production had already invested 100% in the modern technology to save labor cost and to effectively irrigate fertilizer, pesticide, and bacteria protection to pepper plants. It cost them between 5,000 to 6,000USD per hectare to install the system.

The study team interviewed 3 companies who imported and provided technology: Angkor Green, CamAgriculture and IMIS. It seems that Angkor Green became more active in Memot since the company invested their staff and experts to work with their agents to promote their products and services.

B. Producers

The table 2 above shows that there are more than 5,400 pepper producers in six target communes of Memot. Average size of pepper plantation is 0.42 ha. According to the most update commune database (lists of pepper producers in three communes in 2014), only few pepper producers have pepper farms from 1 to 5 hectares. The majority (99%) of pepper producers in Memot district are smallholders.

Pepper producers in Memot have been selling their peppercorn at farmers' gate, mainly to Vietnamese collectors and Khmer sub-collectors who came to the villages. Only some members of Da Memot cooperative who sold pepper to the Kam Spice company under facilitation service of the cooperative who was get 100Riels/Kg commission from the company. During harvest time of 2014-2015, pepper producers in Memot sold their black peppercorn to Vietnamese collectors and Khmer sub-collectors at a price between 3,500Riels (8.53$) and 39,000 Riels (9.51$) per kilogram at farm gate for the density of 550g/l. Memot black peppercorn of the same quality was sold per kilogram at 5.65 US$ in 2012, 5.79 US$ in 2013, and 6.90 US$ in 2014.

The Da Memot cooperative did not collect or purchase black peppercorn from members for market because trading pepper requires a huge capital investment and is a risky business. Peppercorn price usually fluctuates. With limited volume of peppercorn, Da Memot cooperative could not easily have negotiation influence in the market. Additionally, members who are producers need funds immediately from selling peppercorn after harvest for their farm operation expense purpose. The cooperative could only play role as the facilitator who link their members to traders or exporters such as Kam Spices.

Interview with pepper producers confirmed that all pepper producers got market price information only from Vietnamese and Khmer collectors. For quality standard, majority (80%) of them seem knowledgeable about its basic requirements (density and moisture rate).

All farmer respondents answered that they do not know how to produce white or red peppercorn.

C. Collectors/traders

During harvest period, many Vietnamese traders usually come to buy peppercorns, paying in cash at farmer's gate. Each Vietnamese collector is buying from 200 to 300 Kgs a day and transport it by own motorbike to Vietnam. During recent harvest season, they bought black peppercorn from farmers in Memot at between 35,000 Riels and 39,000 Riels per Kilogram. According to results of interviews with pepper producers, Vietnamese traders did not require too high quality of pepper. It meant that they are buying mixed quality of pepper. Khmer sub-collectors or village collectors have been buying also pepper from farmers at farmer's gate at the same price as Vietnamese collectors. They paid farmers in cash and sometimes they purchased it on credit from one week to 10 days from farmers who know well the sub-collector. In some cases, Khmer sub-collectors can earn commission fees from 100-200 Riels per Kg from Vietnamese collectors by introducing farmers to sell pepper to them because Khmer collectors had good connection with farmers. Since Vietnam is the first pepper export country in the world, traders in Viet Nam need more quantity of pepper for their export market. Many pepper cleaning and processing plants are based in Vietnam. Pepper therefore can be easily processed and exported from Vietnam.

Most of pepper collectors and traders in Memot usually use visual testing inspection: colors, foreign matters and sensing on moisture contain by touch and bite the pepper grain. In addition, they also use their own measurement, a can with a size of L11cm x D11cm for grading

pepper. The density of 550 g/l is best; between 550 - 520 is medium; and lower quality is lower than 520g/l. Different price was about 2,000 Riels (or 0.50$) per kilogram per pepper grade. Farmers did not know well the grading system but accepted this method for many years. Vietnamese collectors therefore did not have transparent pepper grading system.

Khmer sub-collectors have been working with main collectors in Da and Memot towns to buy pepper from farmers. They earn commission from 200 to 500Riels per Kg. Study team met four main collectors and six sub-collectors in Memot. They were not only trading in peppercorns from farmers in Memot, but from farmers in nearby areas such as Kratie, Mondulkiri and Ratanakiri. As shown on the figure 1 above, main collectors have 4 types of markets/clients: Vietnamese traders/processors, Thailand traders/processors, Phnom Penh traders/processors, and registered pepper exporters in Cambodia. Their trading term seems that pepper buyers can deposit at least 10% of contract or at the order and payment of 90% of remaining amount is done at the delivery of pepper to client's premises. The main collectors did not use bank guarantee or L/C for their trade. The main collectors sometimes exchange trade of pepper with Vietnamese traders for export pepper to Thailand. It means that Vietnamese traders sometimes sell pepper to main Cambodian collectors for exporting to Thailand. This speculation in prices can cause farmers to be in loss situation since they could not benefit from higher market price of black peppercorn supplied to Thai market, especially from September to November. Our study team did not have enough time and means to investigate this with traders in Poipet, Cambodian Thai border.

D. Processors

There was no processing of peppercorn at farmers' farm level. Only one main collector, Mrs. Chhay Sor, has produced white pepper processing at her premises. Study team met representative of SELA PEPPER Company that invested the biggest cleaning and processing plant in Memot. However, the company did not yet start any processing with it. Two main

pepper processors in Phnom Penh were interviewed. They grind peppercorn into pepper powder.

"Two dragons" pepper powder brand owned by Chea Sokhom who manufactured it at #30, National road 1, Sangkat Nirod, Khan Meanchey, Phnom Penh and "Tiger head" brand owned by Hour Kry who manufactured it at #598 , Sangkat Svay Park, Khan Reussey Keo. They are both buying black peppercorn from Mrs. Khov, a biggest pepper trader in Phnom Penh who has been trading Memot pepper. During the study period, they purchased black peppercorn at about 10$ per kilogram. To challenge local market, processors mixed pepper powder with other products in order to keep selling price of powder at 8.50$ per Kg to their retailers (grocery's) in main traditional markets in Phnom Penh: Oreussey, Deum Kor, Chbar Ampov, Olympic, Toul Tumpoung, and Kandal. Those retailers were not only selling pepper powder but also peppercorn (black and white). It was surprise that interviewed retailers promoted their pepper products as Kampot pepper in order to better sale of their products. Peppercorn and powder were not just sold at traditional markets in Phnom Penh but also distributed within other provinces within grocery's market. The total of pepper demand in the country was estimated at 500metric tons a year[10].

For tourist and high end market, peppercorn from Kampot, Memot and other provinces were packed nicely and sold at souvenir shops in Phnom Penh, Siem Reap and other tourist sites. Those pepper products with different brand names (for instance, Orchel Organic Farm, Kravanh

[10] *It was verified with consumption data (35g/person/year) by NEDSPICE Pepper Crop Report, Presented by Alfons van Gulick at the ESA Annual Meeting, Murcia, Spain, 2014*

Pepper) were also sold in supermarkets and mini marts in Phnom Penh and other cities. The total of pepper demand for tourist and high end market was estimated at 50 metric tons a year. Peppercorn was mainly from different production areas of Kampot, Koh Kong, Kampong Cham, Kratie, Thboung Khmum, Ratanakiri and Mundukiri provinces.

E. Distributors/traders in Phnom Penh

According to interview with main collectors in Memot, there are only a few pepper traders in Phnom Penh have been trading the pepper from Memot and other provinces. However, main collectors in Memot did not give their contact details since it was their trade secrets among main collectors in Memot. These traders were not only selling peppercorns to processors in Phnom Penh but also selling pepper to traders in Poipet for Thailand market. Study team found and contacted only one pepper trader in Phnom Penh who has been trading about 150 metric tons a year from main collectors in Memot. The pepper distributor in Phnom Penh estimates that local pepper demand per year is between 400-500 metric tons.

Our research team also contacted 17 pepper traders based in Phnom Penh and Kampong Cham province, who advertised their pepper business on Alibaba website but no one of them is currently active.

F. Registered pepper exporters

Olam Company, the third largest pepper trader in the world, has been active in Cambodia since 2011. Olam exported thousands of metric tons of Memot pepper per year through Memot cross border gate. However, export data was not presented within the Ministry of Commerce (recording only companies who were applying for CO).

The Kam Spices Company was just established and so far purchased 40 metric tons of black pepper but to date do not yet export their product. Kam Spices has partnered with Da Memot

cooperative to purchase peppercorns from farmers who are members of the cooperative. The company will have market in USA and Europe.

The SELA PEPPER Company was also recently established and installed processing equipment and technology in Memot. The capacity of cleaning and sorting pepper grain is approximately 1.5 metric tons per hour. However, to date they do not yet start buying and processing activity.

The AMRU Rice company started to exported 60 metric tons of pepper to Vietnam in early 2015. The company sold it to an international pepper trader in Vietnam with Delivery Duty Unpaid (DDU) term. The company would expand their trade in near future since they would partner with other pepper international traders.

The Long Best Development Co.,Ltd once exported Memot pepper to Taiwan; Tang Huy Pheng company also once exported black pepper to India; and ECT Co., Ltd which planted pepper in Snoul, Kratie exported their pepper to China.

Khy Thay Corporation and Angkor Green companies were looking for buyer abroad as they plan to make business on Memot pepper. However, to date they do not yet get any purchase contract.

According to pepper export data released by the Ministry of Commerce, it seems that export market besides Vietnam and Thailand was not stable in terms of volume and price. It was hard to provide specific projected export figures besides those were mentioned on section 4.2 above.

G. Micro-Finance Institution and Bank

Results of meetings with commune chiefs let us know that 8 active micro-finance institutions are currently present in Memot district: Prasak, Amrith, AMK, KREDIT, Vision Funds, Staphana, and Hatha Kaksekar. Besides, two banks are operating their business in the district: Acleba and Canadia banks. ABA bank seems started to expand their business in Memot.

60% of loan of Acleda bank in Memot was provided to pepper related businesses; half of these loans were provided to small pepper producers. Many small pepper producers then found financial services from MFIs. Acleda bank provided interest rate less than 15% per annum for loan amount from 10,000$. The period of loan was up to 72 months. The interested rate of MFIs was found from 18% to 25% per annum. These interest rates are very high, not suitable for agriculture production.

Bank loan would be more competitive since a few banks are interested in Memot market. For example, ABA bank would provide loan to cooperative and farmers less than 10% per annum which would be more competitive to other bank. Micro finance institutions would also be more competitive due to several MFIs presented in the areas and they may consider lower risk of pepper production and trading businesses.

H. Transport and logistics companies

Study team identified two main freight forwarders who have been working with pepper exporters: PANTOS Logistics (Cambodia) Co.,Ltd and SO Ngoun Group Co.,Ltd. PANTOS has a warehouse in Trapaing Sre, Snoul, Kratie (Cambodian Vietnamese border) for agriculture product export to Viet Nam. The company experienced in arranging export of pepper for 3 companies. So Ngoun Group owned its branch in Ho Chi Minh city. They had very experienced staff who can speak both languages (Khmer and Vietnamese). It seems that export of pepper across Kratie or Tboung Khmum borders cost about 5-8USD/MT cheaper than from Phnom

Penh or Sihanoukville port. For export of pepper and other agriculture products, the following procedures must be followed[11]:

- Application form for Certificate of Origin by the company
- Invoice
- Packing list
- Bill of Lading
- Cambodia Outward Declaration

After having exported the goods, the following documents must be submitted further:

Certificate of Quantities of export goods by CAMCONTROL (CQ)

- Customs Declaration by the General Department of Customs and Excise of Cambodia (CD)
- A copy of cheque proving the payment of administrative fee
- Proof document proving the origin of the goods that the company buys (in case of milled rice and agricultural products in which some are sensitive).

I. Ministry of Agriculture, Forestry and Fishery (MAFF), Department of Industrial Crops

According to the Department of Industrial Crops, pepper became recently an industrial crop that MAFF has paid attention. Normally, the role and relationship of the Department and Ministry are:

- Provide technical support to pepper producers;
- Provide license and certificate to input supply importers;
- Monitor the distribution of fertilizer, pesticide, herbicide and fungicide.

Due to limited budget and no project available for pepper sector, the Department of Industrial Crops did not play significant role in pepper production. Until 2011, it seems that the

[11] *Prakas on Revision of Certificate of Origin Issuance Procedures, MoC, May 23 2013*

Department could provide pepper data to public. The PDoA seems also have limited intervention in pepper production, especially control of using pesticide, herbicide and fungicide for pepper production. These products have been illegally imported and have been used by pepper producers with proper instructions because they were still in Vietnamese language.

J. Ministry of Commerce, the Department of Import Export

The main roles of the ministry and its line department are to:

- Provide license and certificate to exporters/traders;
- Promulgate and oversee the export procedures and formalities;
- Promote the export/trade of Cambodian agriculture products including pepper.

Though procedures have been set clearly, it takes lot of time and cost for exporters to get documents completed. However, paperwork arrangements can be done through services of any experience freight forwarders. It seems that exporters can export cross border without CO application. They must only present their certificate of phyto-sanitary issued by MAFF at border custom. Pepper export data produced by MAFF is based on phyto-sanitary certification requested by exporters. This data is different from MoC's data that is based on request for CO by exporters. Registered exporters in Cambodia must pay sale tax of 1% and tax on profit to the government. This is a great challenge for registered companies to compete with local traders who sell pepper to Vietnamese traders without taxes. For rice sector development, export of rice has been granted tax and duty exemption. To promote export of pepper officially from Cambodia, request to the RGC must be followed the same processes as it did to promote rice export.

K. Local authority

Local authority including commune and village authorities collect pepper production data in their villages and commune and report these data to their line authority and provincial department of agriculture. They also provide this information to NGOs and other stakeholders

if they request. Pepper producer association or cooperative must also notify them. Small-scale pepper producers who apply for loan to MFI and bank need the commune chief to certify on their application. Some input suppliers, especially fertilizer importers have been working with some commune and village authorities to mobilize pepper farmers to attend promotion/dissemination workshop.

L. Da Memot cooperative

Regarding to pepper producer organization, Da Memot cooperative is the first farmer organization active in the area with more than 300 members. Study team found also a new farmer cooperative established within Treak commune. However, this cooperative is still young and not yet well functioned.

The Da Memot cooperative was established in March 2010 with technical assistance and support by the German Organisation DGRV (Deutscher Genossenschafts- und Raiffeisen Verband), an umbrella organisation supporting cooperatives in developing countries worldwide[12]. So far, the cooperative have been mobilizing their members to access better input supplies, loans, and pepper market. The cooperative invested in warehouse to do input trading to their members and through their network and partners, the cooperative shared new innovations for improving pepper productivity and quality. Currently, the cooperative mobilized shares among members and got the total share amount of about 500 million Riels (approx. 125,000US). The fund has been loaned to their members for expansion of their farming.

M. Donors/NGOs (DGRV, CIRD/HEKS Cambodia)

DGRV supported the establishment of the Da Memot Pepper Cooperative in 2010 along with a GTZ/DED private sector promotion project and has provided financial and technical assistance until the end of 2014. Their main support areas were:

[12] *http://www.memotpepper.org/Cooperative.html*

- Basic organizational, logistic and administrative support.
- Support pepper plantation knowledge (especially on pest & disease control) sharing among Da Memot Cooperative members.
- Support participation at national/international fairs, exhibitions and IPC congress 2010-2013.
- Facilitate national and international experience exchange.
- Promotion of pepper growing area in Memot through TV, newspaper, website, etc.
- Organic & fair trade survey
- Introduce a new buyer to the cooperative then they could make first official pepper export from Memot into the EU.

With the project support, the cooperative has developed a good and strong leadership, follows coop principles and includes actively its members in the decision making process. In collaboration with DGRV the Dar Memot Pepper Cooperative could continuously strengthen their internal organizational structures. ToT provided to key farmers further helped to raise awareness on a variety of technical issues related to proper farm management (e.g. IPC pest and disease control for black pepper, fertilizer application, basic quality standards, etc.). However, the support on pepper production techniques was very light as DGRV's support focused mainly on cooperative establishment and organizational strengthening. The interest of national and international traders in pepper from Memot and other Cambodian provinces has increased significantly. In general, the number of members in the Da Memot Pepper Cooperative rose from 104 in 2010 to about 350 in 2015.

Over the years the cooperative managed to increase its capital constantly. The Dar Memot Coop provides small loans from these share capital to coop members and distributes dividends during the annual general assemblies. Anyhow, access to capital is still difficult for the cooperative and not possible without adequate collateral. Recently land has been purchased by the cooperative on which a new office and warehouse will be built. Pepper farmers earn currently much more than before the establishment of the cooperative in 2010. However, this

was mostly due to the constant increase of pepper prices in the last few years from which all Cambodian pepper farmers were benefitting.

4.5 Analysis of cost and benefit of main actors of pepper value chain

Estimated production cost of pepper per kilogram

Results of individual interviews with 42 pepper producers in Memot showed that small producers invested in pepper plant and get return on investment from year 2 and 3. Similarly, medium scale holder gets their return on investment from year 2 and 3 as well. In general, medium farmers may not sell their pepper stems as small farmers because they rather use them for farm expansion.

The table 9 below provides details of pepper initial investment and operational costs per hectares of 2,000 poles:

Table 9: Pepper initial investment and operational cost per 1 hectare of pepper plantation (2,000 poles)

Items	Year 1 Price/ha (US$)	Year 2 Price/ha (US$)	Year 3 Price/ha (US$)
Land			
Land Cost (Remote)	5,000.00		
Land Clearing (Logging and burning)	600.00		
Land Preparation (Land Leveling and softing)	600.00		
Digging/drilling well	1,000.00		
Initial Material			
Wooden Pole	11,000.00		
Shading Nets	3,000.00		
Wire	500.00		
Planting material	4,500.00		
Pipe	2,617.00		
Water pump	450.00		
Fertilizing			
Inorganic(NPK)	420.00	840.00	840.00

Items	Year 1 Price/ha (US$)	Year 2 Price/ha (US$)	Year 3 Price/ha (US$)
Organic (Cow dung)	900.00	1,800.00	2,761.00
Pesticide	250.00	250.00	250.00
Weedicide	100.00	100.00	100.00
Labour			
Installing Poles			
Putting Shade	1,500.00		
Installing Irrigation			
Digging holes	250.00		
Planting	150.00		
Weeding	248.00	140.00	230.00
Mulching	250.00	250.00	250.00
Pruning/typing terminals	383.00	767.00	291.00
Fertilizer application(digging and application)	400.00	800.00	800.00
Pesticide spraying	125.00	230.00	230.00
Watering	480.00	480.00	480.00
Harvesting		1,150.00	2,301.00
Total per ha	34,723.00	6,807.00	8,533.00
Cost per pole with land cost	**17.36**	**3.40**	**4.27**
Cost per pole without land cost	**15.36**	**3.40**	**4.27**

Source: *survey data*

Based on table 9 above, initial investment (excluded land cost) cost per pole was 15.36 US$. If average of investment is assumed for 12 years, the total depreciation at the third year cost was 3.84 US$. At the year 3, the total expense for one pole of pepper was 11.51 US$. In Memot, a pole of pepper plants could yield an average of 2.25 kilograms of black peppercorn (survey data which excluded 25% of average yield lost due to diseases). It means that average cost of 1 kilogram of black peppercorn was about 5.11 US$.

Small farmers who own less than 2,000 poles of pepper plants generally save up to 10% of their costs because their own labor involvement and slightly better yield of peppercorns. It means that 1 kilogram of their black peppercorn cost approximately 4.60 US$. However, NEDSPICE Pepper Crop Report 2015 mentioned that the cost per kilogram for black peppercorn was between 2.50 -3.00 US dollars.

Cost and benefit analysis

The table 10 below provides cost and profit received by all value chain actors identified.

It seems that pepper producers have been profitable along the chain. It is worth for their hard work and risky investment. The market price of black pepper in 2015 was reported at 9.30 USD/Kg was favorable for farmers.

Table 10: Cost and benefit analysis for each value chain actor

Value Chain Actor	Production cost ($/Kg)	Other direct& indirect cost (US$/Kg)	Selling price (US$/Kg)	Profit margin (US$/Kg)	Rate of Return on Investment (%)
Small farmer	4.6	-	9.30	4.70	102.17%
Medium scale farmer	5.11	0.030	9.30	4.16	80.93%
Sub-collector	9.30	-	9.348	0.048	0.52%
Main collector	9.348	0.164	9.756	0.244	2.57%
Exporter/traders	9.756	0.490	11.50	1.25	12.24%
Traders in Phnom Penh	9.756	0.16	10.30	0.38	3.90%
Processors (pepper powder)	6.57	0.43	8.00	1.00	14.29%
Distributors/whole sellers (pepper powder) in Phnom Penh	8.00	-	8.50	0.50	6.25%
Retailers (pepper powder)	8.50	0.05	11.00	2.45	28.65%
End consumers in Cambodia	11.00				

Source: *Study primary data*

Based on above cost analysis, small producers could have their profit margin up to 102% while medium scale producers could get profit up to 81%. This was because the high price of pepper during harvest season in early 2015. This price increased 4.65 times compared to its price in 2009 (was only 2USD).

Though profit margin rate for sub-collectors and main collectors was very little, they have made lot of money for pepper trading since the volume is huge. For example, a main collector trade 2,000 metric tons a year could make over 500,000 USD. Small farmers who harvested only 0.1 ha could make money around 2,100 USD for whole year with very hard work and face with big challenges of serious plantation damage from technical mismanagement and climate condition (dry and flood). For medium scale producers, they could make money an average of 21,150 USD per hectare of harvested pepper plantation.

Though pepper exporters/traders get lower rate of profit margin but they have lower (compared with producers) risk because they trade pepper only when they have contract or order from their clients. Had long experience in trading pepper, exporters tend to have good plan of purchase and export. Based on recent MoC export data, pepper increased its official export by registered exporters. This is a good sign of export market movement.

Processors who clean, grind and package pepper for local market made a profit margin of 14%. For example, one processor trading 100 metric tons a year could make over 100,000 USD per year. Before end consumers, pepper retailer could make a huge profit margin up to 29% with lowest risk to distribute the processed pepper products in the market, especially ground pepper.

4.6 Analysis of key constraints and opportunities of each value chain actor

The following section describes analysis of key constraints from input suppliers to processors.

4.5.1 Input suppliers

Currently, the main input suppliers are supplying fertilizers, pesticide, herbicide, and fungicide and irrigation materials.

Table 11: Key constraints and opportunities for input suppliers

Constraints	Opportunities
• High competition among different imported input suppliers. • High cost of importing inputs. Normally fertilizers are free import taxes but others are still not, for example plastic tubes. • Vietnamese fertilizers, hormone, pesticide, herbicide and fungicide have been imported and traded illegally. These lead to an unfair competition of trade among importers. • Limited capacity and skills of technical staff to disseminate new innovations to pepper producers.	• Farmers keep expanding their production. Input demand has increased. • Farmers started using high quality inputs and new technologies, for example, drip irrigation.

4.5.2 Pepper producers

Table 12: Key constraints and opportunities for pepper producers

Constraints	Opportunities
• Difficult financial access due to Bank and MFI interest rates are too high, especially for small producers. • Limited knowledge and experiences in cultivation techniques (selection of seedlings,	• Increase of pepper price over last few years, pepper farmland become more expensive and farmers can use their land ownership as collateral for loan application to any MFI or bank.

Constraints	Opportunities
selection and use fertilizers and pesticides, etc.) and post-harvesting techniques (e.g. drying, storing), which can lead to low quality. New small farmers have high risks of getting lost due to unable to tackle pepper pests and diseases. About 65% of interviewed farmers revealed that they lost 1 - 10% of production every year while 30% of respondents told they lost from 11 to 60% and 5% of them said they lost all planted crop due to diseases happened to their pepper plants. So, an average potential loss of yield for small farmers was 25% over potential yearly yield per hectare (which was 6MT/ha/year). • Instructions for inputs are often labeled in other languages (e.g. Vietnamese or Thai) that many farmers cannot read, potentially resulting in inappropriate use (in terms of inputs, timing, and over-application) and understanding of residual risk. This may affect export quality. 8 of 42 interviewed farmers did use products labeled in Vietnamese or Thai languages. 24 of 42 farmer respondents did not know well how to use fertilizers. • Lack of market information that can help farmers to do better plan for plantation:	• Several MFIs and banks have been very active and giving competitive interest rate and services to their clients including to small pepper producers. • Less intensive use of chemical fertilizer and pesticide on pepper. The quality of Memot pepper has been still accepted by export market. • Several national companies are interested in exporting pepper directly and officially. SELA PEPPER invested in cleaning and processing plant. Export market may be expanded. • CIRD and HEKS NGOs would be involved in the pepper development through their coming project in Memot.

Constraints	Opportunities
quality and quantity to meet diversity costumer needs. • Limited access to market, especially export market. Not many registered pepper exporters in Cambodia who come to trade Memot pepper. Producers felt not safe about pepper market price. They were afraid that it is going down fast. • Some farmer respondents did not know the standard requirements. Farmers have poor knowledge to do grading pepper, or processing high quality for market demands. They do basic processing, cleaning, winnowing, bagging, and storing in the house. The visual testing of quality just provides them only the dryness and cleanness. It needs more understanding on quality grading system and technique to make sure quality demand of market is conformed. The deal between farmers and traders has not given powers to farmers. Since quality standard is not being used, farmers sell pepper to traders unknowingly the quality of pepper and grading systems. • Unlike Kampot pepper, so far Memot pepper do not has strong support from government agencies and NGOs to improve pepper industry.	

4.5.3 Sub-collectors and main collectors

Table 13: Key constraints and opportunities for pepper collectors

Constraints	Opportunities
• High fluctuated price of pepper affect purchase plan. • Limited access to pepper cleaning and processing technologies. • High competition with Vietnamese collectors who come to buy at farm gate. • Do not have several registered export partners in Cambodia for purchase contract. • Cash transactions for purchasing pepper require a huge investment fund for collectors. Many farmers were not yet familiar with bank system for their pepper sale. Similarly, collectors did not well use the bank system for their local and international trade transactions.	• Quality of Memot pepper attracts local and international investors to do processing and trading the product. Kam Spices, SELA Pepper, Khy Thay Corporation, AMRU Rice, and other coming companies have invested or looked at export opportunities. • Pepper production and harvest areas keep increasing every year. Volume for trading the pepper would be bigger and give collectors more profitable. • Future NGO project support could promote pepper market and sector development.

4.5.4 Exporters/traders

Table 14: Key constraints and opportunities for exporters/traders

Constraints	Opportunities
• High fluctuated price of pepper affected pepper purchase and sale. • So far, peppercorns must be transported to	• Quality of Memot pepper has been recognized by pepper international market. • Pepper production areas are closed to

Constraints	Opportunities
Vietnam for cleaning and processing before exporting to consumers 'countries. • Illegal trading pepper to Viet Nam and Thailand put exporters/traders in challenging selling price of pepper to consumers 'countries. • Official export procedures and requirements consumed time and burden export costs for exporters/traders. Operating and transporting costs were also higher compare to neighboring countries. The RGC did not yet promote pepper export yet. Exporters must pay 1% on sale tax, profit tax and other taxes and duties. The RGC did not yet wave any procedures and taxes for pepper export promotion. • Pepper collectors did not use bank system for their trade, for example L/C and bank guarantee. Cash transactions provided burden to exporters/traders. • Credit insurance was not yet ready for national trade. This service could help traders/exporters to work with local collectors for any purchase contract. • No strategies for pepper sector development.	Vietnam, the first pepper exporter in the world. Exporters can find either its direct market in consumers 'countries or in Vietnam where existing pepper exporters have been doing this business. • Kampot pepper market has been boom and its reputation attracts intervention of the RGC and more investors for improving the sectors. • The SELA Pepper Company invested in cleaning, grading and processing pepper for export market. • Future NGO project support could promote and strengthen Memot pepper market as well as the development of pepper sector.

Constraints	Opportunities
All the actors are not concentrated on building pepper industry competitiveness but they try to earn as much as possible. There is no partnership in doing trade between farmers and traders or collectors.	

4.5.5 Processors

The processors are those do processing black pepper to white or ground pepper.

Table 15: Key constraints and opportunities for processors

Constraints	Opportunities
• No new processing technologies introduced to processors. • Limited knowledge of pepper market for processed pepper: white, red, and ground pepper. It was not easy to invest in any processing technology if processors did not know well market demand for the processed products. • Unfair competition among processors and importers for ground pepper. Pepper powder trade has been challenging its quality and price competition. Mixing pepper with other products affect pepper quality and brand, particularly when the higher market price of peppercorn.	• Processed pepper products would be easily sold when Memot pepper is promoted and well-known. • The recent grow of food industry (thanks to tourist market growth) need more pepper for local food processing. New generations, especially young people have changed their food preferences due to their life style in main cities. Food processing would need more quality ingredients. Pepper is one of options. • Pepper used for medicinal and other industries was not found. New investors could make money in this unexplored market.

4.7 Potential end distribution markets for both local market and export

Since many years, Memot pepper has found about 64% market in Vietnam through Vietnamese collectors, about 30% market in Thailand, 5% market in the country, and 1% export market to pepper consumer countries. The following section gives more details of each market.

4.6.1 Potential local market

The GTZ study in 2009 found that Memot pepper has been locally consumed either in black peppercorn and powder at about 350 metric tons a year. The current local consumption of pepper is estimated at approximately 500 metric tons. It has been mainly distributed by a few traders in Phnom Penh to traditional market retailers in Phnom Penh (Oreussey, Doeum Kor, Chbar Ampov, Olympic,…) and redistributed to retailers in provincial towns. Two main processors have been grinding peppercorn and distributing pepper powders within food retailers.

Black, red and white peppercorns found its high end and tourist markets in Phnom Penh, Siem Reap, and other tourist destination cities. The high end and tourist markets however could absorb a small quantity of Memot pepper since a few pepper traders or pepper farms have packed and sold their products at souvenirs shop, minimarts, and supermarkets.

The study did not identify other potential local markets of fresh peppercorn as food and black peppercorn as raw materials for essential oil, medicine and other industries.

4.6.2 Export market

As mentioned above, Memot pepper found its biggest market in Vietnam because Vietnam is the biggest pepper exporter in the world. Exporters in Vietnam had already their markets in many consumer countries listed on table 16 below. Vietnam exported pepper more than 133,000 metric tons a year to many countries and all continents in the world.

Table 16: Vietnam pepper export market

Country of destination	Volume of export (MT)				
	2009	2010	2011	2012	2013
United States	14,917	16,414	23,066	16,881	25,830
Singapore	6,057	2,867	4,182	6,582	11,176
Germany	14,012	14,997	10,319	10,763	10,925
United Arab Emirates	11,053	13,180	12,310	10,310	8,865
Netherlands	8,376	8,326	8,416	8,111	8,346
India	6,269	6,234	6,696	5,718	5,662
United Kingdom	2,434	3,191	3,583	3,792	4,339
Egypt	7,207	3,180	5,743	5,903	4,084
Russia	5,285	3,879	3,949	3,105	3,963
Spain	4,035	1,890	3,970	3,997	3,374
Korea, South	2,130	2,275	2,233	2,598	2,888
Philippines	2,196	2,030	1,701	2,478	2,763
Poland	3,725	3,277	2,377	1,915	2,602
Pakistan	6,449	3,794	5,447	2,978	2,378
Ukraine	2,714	2,630	1,866	2,151	2,364
Thailand	-	1,698	1,065	1,099	2,205
Japan	1,867	1,778	2,061	1,512	2,095
South Africa	1,343	1,206	1,352	1,370	1,817
France	2,580	1,828	2,043	1,795	1,641
Australia	1,099	820	917	1,337	1,631
Turkey	2,153	1,248	1,828	1,741	1,566
Italy	1,612	1,131	1,005	1,436	1,563
Canada	1,022	729	764	1,151	1,273
Malaysia	2,699	1,681	768	728	980
Belgium	846	734	850	658	501
Kuwait	249	183	206	317	275
Indonesia	3,403	2,563	1,143	104	100
Saudi Arabia	1,449	1,337	-	-	-
Algeria	1,423	930	-	-	-
Israel	1,098	889	-	-	-
Sweden	546	838	-	-	-
China	1,234	815	-	-	-
Syria	1,587	745	-	-	-
Greece	1,086	728	-	-	-
Others	10,250	6,827	14,001	16,270	17,749

Country of destination	Volume of export (MT)				
	2009	2010	2011	2012	2013
Total	**134,405**	**116,872**	**123,861**	**116,800**	**132,955**

Source: *Pepper Statistical Yearbook 2013*

According to pepper import data in Vietnam on table 17 below, Vietnam has been importing pepper from other pepper production countries including Cambodia. In 2012, Vietnam imported about 17,000 metric tons with an increasing trend.

Table 17: Vietnam pepper import data

Country of origin	Volume of import (MT)				
	2008	2009	2010	2011	2012
Indonesia	3,961	3,606	18,574	4,765	14,202
India	803	240	1,353	4,743	886
Brazil	323	667	1,400	2,174	375
Malaysia	717	520	760	508	321
Cambodia	-	-	-	258	155
United States	39	-	1	-	108
China	572	122	198	395	60
Ecuador	-	-	-	-	36
Sri Lanka	-	-	115	-	28
United Kingdom	42	-	-	-	22
Netherlands	13	17	-	-	8
Singapore	41	40	398	1,245	1
France	-	-	-	-	-
Nigeria	-	-	27	-	-
United Arab Emirates	10	-	-	41	-
South Africa	-	-	43	-	-
Colombia	-	-	18	-	-
Egypt	422	177	-	-	-
Japan	774	-	-	-	-
Bulgaria	215	-	-	-	-
Spain	20	-	-	-	-
Others	28	315	133	184	660
Total	**7,980**	**5,704**	**23,020**	**14,313**	**16,862**

Source: *Pepper Statistical Yearbook 2013*

Thailand shares 30% of Memot pepper market. Traders in Phnom Penh and 4 main collectors in Memot have been exporting black and white peppercorn to Thailand cross Poipet border.

Like Vietnam, Thailand is pepper producer, importer and exporter country. Table 18 below shows that Thailand imported about 2,000 metric tons in 2013 with an increasing trend.

Table 18: Thai whole pepper import data

Country of origin	Volume of import (MT)				
	2009	**2010**	**2011**	**2012**	**2013**
Viet Nam	15	1,727	986	901	1,908
Malaysia	15	13	175	93	130
China	51	27	2	1	6
Indonesia	-	-	-	-	2
Germany	-	-	-	-	1
France	-	-	-	-	-
Japan	-	-	-	1	-
India	2	3	-	-	-
Brazil	-	-	-	-	-
Egypt	-	-	-	-	-
Italy	-	-	-	-	-
Australia	-	4	3	-	-
Cambodia	-	100	-	-	-
United States	1	2	-	-	-
Others	-	-	1	1	1
Total	**84**	**1,876**	**1,167**	**997**	**2,048**

Source: *Pepper Statistical Yearbook 2013*

Memot pepper was not only sold to Vietnam and Thailand but also exported directly to some countries: Taiwan, China, India, and Germany through registered exporters in Cambodia. Some registered exporters: Kam Spices, SELA Pepper, AMRU, Angkor Green, Khy Thay Corporation, Tan Huy Pheng, Long Best Development, ECT and Cambodian Advanced Agro Trade Co., Ltd companies were looking export of Memot pepper to European countries, China, Taiwan and other countries. This study however could not get projected volume of pepper to be exported since those companies did not have their export contract. For direct market of pepper in

Cambodia, the list of locally registered exporters/traders with contact details and pepper trading status on annex 6 provides overview export market of pepper in Cambodia. For indirect market, the list of and international companies trading pepper on annex 7 provides global market of pepper that registered exporters in Cambodia can target their future market.

4.8 Quality standard requirements for end export market

This study and GTZ study in 2009 found that local producers in Memot have adapted to purchase requirements of Vietnamese and Khmer collectors (density, moistures, and foreign matters). It may not easy to introduce any standard requirements. Normally, the pepper quality standard traded so far was density from 500 to 550g/l, moisture from 12 to 13.5% and foreign matters less than 2%. For more information about pepper export quality requirements, please refer to annex 5.

Memot pepper quality was still considered as good quality pepper by pepper traders in Vietnam and Thailand. Recently, pepper Crop Report 2015 of NEDSPICE noted that exports of pepper from Vietnam to European countries have declined due to quality issues. It may come from production problems: used too much chemical fertilizers, pesticides, hormone or new varieties. At this point of view, Kam Spices and Khy Thay Corporation would like to engage organic and free chemical pepper. However, volume and price for these standard were not sure yet.

5. Conclusion and recommendations

Based on main findings described on the whole section 4 above, we can draw overall conclusion that Memot pepper production has been sharply expanded over the last 3 years. The majority of Memot pepper producers are small-scale pepper producers (99%) owning pepper farms less than 1 ha. Currently pepper is the most profitable cash perennial crops grown in Cambodia. Many farmers who have been investing the crop over several years benefited from the market price which significantly increased from 2 US dollars in 2009 to 9 US dollars in early 2015. Pepper plantation became therefore most suitable crop for small holders because they owned

farmland and had other income sources to secure their livelihood while waiting for pepper plantation to give its first production (2-3 years). Many new pepper producers including medium scale producers have invested in pepper plantation in Memot. However, global pepper demand and supply have a trend of matching in terms of its quantity.

Input supplies including fertilizers, pesticide, herbicide, fungicide, plastic tubes, shading materials, irrigation materials and equipment, and machinery have been distributed by several private companies. Several banks and MFIs have been actively provided financial services to pepper producers and traders because loan demand for pepper investment in the area has significantly increased. Approximately 64% of Memot pepper, particularly black peppercorn has been traded formally and illegally cross border to Vietnam; 30% of it to Thailand; 5% of it has consumed locally; and 1% of it was exported to other countries.

Though some positive moves of Memot pepper production and market benefited to pepper producers and other value chain actors, main constraints/challenges were also identified by the study. There were:

- Limited pepper cultivation, post-harvesting and processing techniques amongst producer has put them in very high risk, especially small holders, when pepper plants got pests and diseases and spread out to all planted pepper plants. As the result, they lost all their investment or had low productivity leading to lost money. Good practices and innovations in cultivation (selection of seedling varieties, selection and use fertilizers and pesticides, etc.), post-harvest and processing techniques were not yet properly promoted, documented and disseminated to farmers.

- Limited understanding about quality requirements for direct export market because producers used to sell their pepper to local and Vietnamese collectors without drying, cleaning and grading their pepper (post-harvest and processing activities). As result, they could only access to market in Vietnam and Thailand through two local market layers. Small holders did not benefit from value added provided by registered exporters

and finally they confined themselves to limited market opportunities and subjected to high fluctuated market price.

- The current Memot pepper market depends too much on informally export market to Vietnam and Thailand. Only a few registered exporters tried to directly export Memot pepper to international end distribution markets. So far, many other exporters could not have access to pepper end distribution markets because of high export costs (export procedures and documents, transportation and sale tax).

- Interest rates provided by local banks and MFIs in Memot are too high for pepper producers.

To solve above mentioned constraints/challenges, following 3 main areas of interventions were recommended.

A- Increase production capacity: planted areas and productivity

Pepper producers, particularly small holders are able to increase their pepper productivity if they applied appropriate cultivation innovations: selecting good pepper seeding and variety (ies), using properly quality inputs (fertilizer, herbicide, pesticide, hormone, fungicide, etc.), and taking care of pepper plants such as weeding and watering, coping with pepper diseases. To achieve this, project interventions should work with selected input supplier companies such as Angkor Green and Khy Thay Corporation to provide training on how to use selected fertilizers and other inputs. Input supplier companies would be interested in demonstration of using their products to proof the input's effectiveness and benefit. Involved in disseminating good pepper cultivation practices to pepper producers in Memot, PoDA and DoA technical staff, cooperative members, and input supplier company technical staff could be facilitated to work together by the coming project.

Once target producers applied good practices in their pepper production, they are going to benefit from better productivity or income. To expand their plantation, small holders are able to use part of income from pepper plantation and loan funds from bank or MFIs. Acleda bank and Amrith MFI were very active in Memot in providing loan to small pepper producers. Project could find a cooperation way with these two finance institutions to provide better loan interest rate and services to small holders. In other way, facilitating the Rural Development Bank to provide directly loan to Da Memot pepper cooperative would be a good approach for cooperative members to get lower interest rate loan. Da Memot cooperative is a model cooperative providing good saving and credit scheme to their members. Project should consider facilitating establishment of new pepper cooperative which adapt good model of Da Memot cooperative. Activities of new established cooperatives could be started from saving and credit among their members. It is recommended that producers who would like to expand their pepper production should be well informed about global trend pepper demand and supply. It means that project staff should constantly provide more reliable price and demand forecast information to all producers.

B- Improve pepper quality

Applying good pepper cultivation practices mentioned on section A above, pepper quality and quantity would be improved. However, pepper quality could be also improved by post-harvest activities, mainly focus on pepper drying, cleaning and grading. The more quality requirements of peppercorn complied by producers, the more value added (better price) would be provided by pepper exporters. Project should be able to facilitate pepper exporters to work with pepper cooperatives on basic quality requirements. However, incentives should be provided to producers to change their traditional practice. For example, additional or premium price of pepper would be given to producers who dry their peppercorn by solar drying system. Facilitating pepper exporters and producers (through cooperatives) to get contract farming or purchase/sale contract is one of strategies to sustain production and supply of Memot pepper. Potential pepper exporter companies: AMRU Rice, Khy Thay, and Kam Spices could be good project partners as they have worked with farmer cooperatives and had good experience of

exporting pepper and other agricultural products. Last but not least, SELA Pepper Company invested in pepper processing plant in Memot. Pepper exporters could work with SELA Pepper for cleaning and grading their peppercorn prior to export it.

Another potential pepper quality standard for export is organic pepper or free chemical. Though specific demand volume and price were not yet identified by this study, this market does exist and would be a good potential one for some small holders who are interested in pepper organic farming. Kam Spices and Khy Thay Corporation were interesting in exporting organic pepper to market in Europe. Once this market is found, book of specifications for producing organic pepper would be applied and approved by an assigned organic certifier.

C- Promote export market

Besides its current markets in Vietnam and Thailand through pepper collectors who informally export pepper, direct and formal export markets to consumer countries should be promoted. The project should facilitate established pepper cooperatives to work with potential pepper exporters (AMRU, Khy Thay, Kam Spices, and other companies) toward direct export market. Benchmarking Kampot pepper promotion, Memot pepper should be branded for export marketing strategies. Project should facilitate to formulate Memot marketing strategies and implement promotion events in and outside Cambodia with its designed brand logo. A Memot pepper website should be formally developed by pepper cooperatives or union; must be constantly updated information; and linked web page of all business partners including pepper exporters.

To better challenge international market, pepper exporters need to be in better cost position. The project should involve the MoC, the department of import and export, and the MAFF, department of industrial crops in weaving procedures, and other related taxes (prepaid sale profit tax). The project may seek to have synergy with DGRV project in order to get government support to pepper export and promotion. Facilitation of forming Cambodian

pepper producer union and Cambodia application for IPC memberships may be the prioritized areas of DGRV project support.

CIRD has a strong experience in implementing promotional strategies for Kampot pepper. The project should be able to benchmark those strategies. 5 key promotional strategies of Memot pepper are recommended as following:

- Creating product label (brand product name, logo, and tag line) is the first important stage before conducting any promotional activities. Project should work with cooperative or pepper producers in Memot or Tboung Khmum province to agree upon the creation of product label with its long term marketing benefit. Product label should be also consulted with key pepper exporters/traders as they may get involved in using it. For long run purpose, project should also facilitate the registration of the branded product label to the Depart of intellectual property protection of the MoC to protect the product.

- Organic pepper, free chemical and other standard should be considered if local and export market demand is found. In this case, the project should facilitate exporters/traders to work closely with producers, input suppliers and certification bodies in order to make it happen. Organic standard requires different plantation and processing practices which incur higher cost. Demand volume of organic pepper may be start with small orders but it is a good potential market of pepper for high end market. The more diversified products can be produced and found market, the better competitive advantage of pepper producers.

- Creating and running a website and a facebook of Memot pepper with uploaded short video and constantly updated information are most convenient advertising tools and activities to promote Memot pepper and effectively disseminate information to producers about production techniques and practices, market information, events, and

other useful information such as national and international media reports. Project should facilitate cooperative or association to work closely with input suppliers and exporters/traders who will be interested in advertising their product and business. They will surely share cost and work together effectively. For linking registered pepper exporters to global business network, project should facilitate the companies to register their profile on Alibaba.com. This wide network can benefit them to get potential pepper trading partners in many countries.

- Promotional events such as national/international trade exhibitions and cooking shows/competitions happening should be supported by the project. Memot pepper brand name is effectively promoted within each event. Some events could be partly or fully sponsored by other organizations.
- Every year, farmer leader and line ministry representative are usually invited to international conferences on pepper. Project should be able to facilitate or support their involvement in these important events.

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