



HORTIN II Co Innovation Programme

Towards cost effective, high quality value chains

Evaluation of Sweet Pepper Pilot Supply Chain for Export

HORTIN-II Research Report nr. 21

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Wageningen, The Netherlands, Jakarta, Indonesia, November 2010.



The purpose of the HORTIN-II programme is to contribute to the development of cost effective high quality value chains for vegetables and fruits. Among others this can be achieved when technology development takes place in close collaboration between public institutions, farmers and private companies.

On the Indonesian side the programme is carried out by the Indonesian Centre for Horticultural Research and Development (**ICHORD**), Jakarta, with the Indonesian Vegetable Research Institute (**IVEGRI**), Lembang, and the Indonesian Centre for Agricultural Postharvest Research and Development (**ICAPRD**) in Bogor.

In the Netherlands the Agricultural Economics Research Institute (**AEI**), Den Haag, the Agrotechnology and Food Sciences Group (**ASFG**), Wageningen, Applied Plant Research (**APR**), Lelystad, and WUR-Greenhouse Horticulture (**WUR-GH**), Bleiswijk, all partners in Wageningen University and Research centre, are involved in the programme.

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The HORTIN-II programme is sponsored by the Indonesian Agency for Agricultural Research and Development of the Ministry of Agriculture, Indonesia, and by the Ministry of Agriculture, Nature and Food Quality of the Netherlands (under project nr. BO-10-006-031.02).

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CONTENTS

Executive summary	7
1. Evaluation of the HORTIN II sweet pepper project.....	8
2. Introduction to HORTIN II	9
3. Evaluation Focus and Evaluation Logic Model	15
4. Results of the Evaluation	17
5. Synthesis and Discussion.....	32
6. Conclusion.....	34
Annex 1 List of farmers, who were interested in participating in the pilot project.....	35
Annex 2a Initial Logic Model	36
Annex 2b. Implemented Logic Model	36
Annex 2b. Implemented Logic Model	37
Annex 3 Evaluation Questions.....	37
Annex 3 Evaluation Questions.....	38
Annex 4 Questionnaire for the contract assessment.....	45
Annex 5. Checklist of Question has been used to interview farmers to find out the reason why do farmers object to provide collateral	49
Annex 6a. MoU between farmers, exporter, the bank, and the HORTIN team (translation).....	51
Annex 6b. MoU between farmers, exporter, the bank, and the HORTIN team (original in Bahasa Indonesia)	54

Executive summary

The current report evaluates the outcomes of the HORTIN II sweet pepper project. This project was conducted over the years 2007-2010. The sweet project has provided an interesting pilot for testing a combination of a technical innovation in production with an innovation in the value chain for sweet pepper in Indonesia.

The evaluation sheds light on the following insights:

1. The wood-metal greenhouse exhibits robust technical performance to the production conditions in Indonesia.
2. The financial viability is also positive, although more attention should be paid to realizing increase of production, to cover for the initial investment costs. Notably, pest management holds strong perspectives for realizing this increase.
3. The relations behind the contract have shown to weaken under rising domestic market prices, negatively impacting the competitive position of the export chain. Also the management of supply of volume needs to become more consistent to support a stronger competitive position. The quality of the product on the other hand, has improved, and contributes to a better competitive position.

The HORTIN II sweet pepper chain model provides a valuable learning case. The case has shown that it is possible to speed up the process of technology adoption through co-innovation between market actors, with support from researchers. However, due consideration needs to be given to the circumstance under which the innovation has taken place. Notably the strong pull on demand in the case of sweet peppers was one of the key factors, which made the introduction of the technology possible. This pull in demand will be hard to replicate under other conditions, and it remains to be seen whether the combination of a technological innovation can be backed without such a strong pull by market demand, notably on the undifferentiated domestic market for The upside is though, that if demand for high quality produce is rewarded, the novel greenhouse system holds the competitive advantage in terms of being a highly productive system and source for consistent quality and quantity of production output.

1. Evaluation of the HORTIN II sweet pepper project

The current report provides an impact assessment of the sweet pepper project, which was conducted under HORTIN II. The assessment is used to determine whether the project is economically viable, socially equitable and environmentally sustainable. Also the assessment has been organized in such a way that implications can be drawn up for replication and scalability of the specific model and interventions used in the HORTIN II project.

The sweet pepper project was conducted by the following research team:

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The report starts off with a general introduction about the complete HORTIN II program and its approach in chapter 2. The same chapter explains the organization and the implementation process behind the sweet pepper program. With this context in mind, chapter 3 presents the general methodology which is used for the evaluation, and chapter 4 will discuss the evaluation results. In chapter 5, key observations from the sweet pepper program are discussed the implications made for scalability and replicability of the program. The report close with the main conclusions in chapter 6.

2. Introduction to HORTIN II

The HORTIN II program started in 2007. A major challenge of the new program was how to let SME's and producers benefit from the innovations of applied and strategic research and development, while at the same time addressing practical demands and bottlenecks in the supply chain.

To ensure that these bilateral initiatives in the field of horticultural research and development lead to impact, research initiatives were linked with the 'drivers of innovation and development'. This was assured by adopting the approach of co-innovation, which encourages co-operation of researchers and private sector actors to target research and development activities for maximum impact. Elements taken from this approach of co-innovation, tailored and modified to fit the Indonesian context, was geared towards making research and development supportive to the creation of sustainable supply chains.

HORTIN II comprised of 3 value chain projects namely:

- Improvement of sweet pepper production technology to achieve competitive supply chains;
- Development of a cost-effective and sustainable hot pepper supply chain;
- Improvement of shallots supply chains;

Facilitating these projects as processes of co-innovation, including match making of private parties and researchers, is appropriate at this stage of development of the horticultural sector in Indonesia. Apart from the development of new technologies based on the needs of the private sector, the focus was on the application and adaptation of already existing technologies. These were developed within the previous HORTIN I and other research and development programs combined with socio-technical understanding of the interests, ambitions, visions and strategies of the supply chain partners involved.

In this context the HORTIN II program was set up as a pilot focusing on how to make supply chains more competitive and to empower farmers in markets by means of innovations and contributions from research and development.

As mentioned, the HORTIN II projects were organized as pilot projects. The according definition provided for pilot project was mentioned in mission report 9. This was defined as:

- An experimental initiative lasting for a limited time; all such experimental ventures are systematically evaluated;
- A pilot project serves as an advance or experimental version or sample of an operation. It provides a model for future development;
- A pilot reveals the aspects related to up scaling which is an endeavour of an experimental nature.

In the HORTIN II set up, private parties were put in the driver's seat regarding how to solve their problems such as direct sourcing, and consistency in supply (in terms of quantities, qualities and safety). By publicly supporting pilot experiments with retailers and traders operating in a particular supply chain, the HORTIN II program aimed to clarify what could /should be the specific role of the Government and the input from the R& D system

2.1 The Sweet Pepper project in HORTIN II

At the inception of the sweet pepper program in 2007, the following objectives were defined for the sweet pepper program (Inception Report HORTIN II):

Long-term objectives:

- To develop sustainable sweet pepper plastic house production technology, which matches the farmer needs through co-innovation.
- To Increase the yield and quality of sweet pepper grown in plastic houses in Indonesia.
- To increase the adoption of technology of producing sweet pepper in plastic houses developed in the research project.
- Increasing farmers' income.

Short-term objectives:

- Identifying the priority bottlenecks in the sweet pepper supply chain based on participatory approach.
- Developing improved and innovative production systems of sweet pepper grown in plastic houses, to increase production and quality based on the bottlenecks' findings in the sweet pepper supply chain.
- Introducing techniques to farmers based on on-farm research.
- Developing the control technique of pest using the IPM concept for sweet pepper production under tropical plastic house conditions in Indonesia.
- Assessing the impact on farmers' income by conducting economic evaluation on both existing and new techniques.

Based on these inception objectives sweet pepper project was executed in 2 phases, a formation phase in 2008 and 2009, and the project implementation phase in 2010. The goal of the formation phase was to build commitment with the stakeholders, who were relevant and willing to contribute to the project. The second phase consisted of an inception workshop with the committed stakeholders to compose the project planning, as well as implementing the defined planning. The following summarizes the process that was organized from project formation to implementation, with special attention to the specific interaction took place with the stakeholders.

2.2. Formation process and implications for implementation

For the organizing of the sweet pepper project, 5 farmer groups were approached in the region of Cisarua, West Java, asking for their interest to participate in the project.. Each group consisted 30-40 farmers. One of the main constraints encountered in the selection of participating farmers was their lack of access to credit for investing in the required green house technology. In order to obtain a loan, farmers were required to hold collateral in the form of assets on their name. However, collective family-owned assets are prevalent in agriculture in Indonesia, because all assets are divided over all the direct family members upon inheritance. This resulted in a group of 10 farmers who remained eligible for participating in the program, as they held assets on their personal names. (List of the farmers show in annex 1)

The second constraint encountered relating to accessing credit was bookkeeping related to cash flow. As a precondition to obtaining a business loan, farmers were required to record their incoming and outgoing cash flow, and provide at least a year's overview. Of the 10 previously

selected farmers, 2 remained that could fulfill this second criterion. Immediately the difficulties to learn from this project in terms of upscaling were recognized, due to the small amount of farmers participating (Description project results over 2009). The goal of strengthening collective action at the producer level also needed to be altered, as there weren't enough farmers to constitute a solid collective marketing effort.

Consistency of supply was one of the key motivations underlying the objective for implementing a novel green-house system in Indonesia. This was demanded by the burgeoning consumer retail markets in the big cities. Many retail chains were visited to gauge their interesting participating in participating as a market partner to the sweet pepper project. The discussions mounted to little interest, as retailers were wary of making trials with direct linkages with new farmers' groups, as they feared that there was no instant solution to making farmers comply. Also retail was afraid to loose confidentiality on their competitive position to partners in the project, and their competitors outside.

An alternative was to link up with intermediaries. Two were approached, Amazing Farms (predominantly serving the local market) and Emerald (serving the export market). Eventually Emerald remained the only relevant partner, as the volumes required on the domestic retail market were too small to absorb the production capacity of the participating farmers. Serendipitous to the involvement of Emerald, the Rabobank was introduced to the project. Rabobank already held an account with Emerald and with Emerald's main client, NTUC, in Singapore. Based on this position in the export transactions, the bank was also willing to look for funding opportunities further upstream in the supply chain with the farmers.

Lastly, the project held the initial ambition to bring production up to Global GAP standard. The exporter also confirmed interest in this standard for serving the wider export market. However it was advised by the local project partners not to jump too lightly into training sessions with farmers relating to food safety standards, as this is not required yet in the local market (mission report 11, May 2008). Mainly motivated by this advise, a choice was made for implementing the Standard Operating Procedure for Indonesia. This standard is less stringent compared to Global GAP, but covers some of the essential food safety requirements for serving the regional export markets.

As a result of the determining interactions with project stakeholders mentioned above, the composition of participants also changed over time. The underlying table provides the complete overview of the participants that were involved in both the formation and the implementation phase.

Table 1. Stakeholders involved in the HORTN II Bell Pepper project during the project formation (2008-2009) and during implementation (2010).

Project formation process (2008-2009)	Project implementation (2010)
Stakeholder overview and analysis	
Research Team:	
- PPO	- PPO
- WUR Glastuinbouw	- Wur Glastuinbouw
- LEI	- LEI

- Ivegri	- Ivegri
- Fresh Studio	- Left due to loss retail link
Financial Services:	
	- Rabobank
Input Suppliers	
- East-West seed Indonesia	- East-West seed Indonesia (standard after sales services)
- Syngenta	- Na.
Retailers	
- Matahari	- Na.
- Ranch Market	- Na.
Exporters/Traders	
- PT Alamanda Sejati Utama	- PT. Alamanda Sejati Utama
Farmer Groups	
- Cooperative MSM	- Cooperative MSM
- Dewa Family	- Dewa Family
- Ermis Group	- Na.
- Sodik Group	- Na.
- Obay Group	- Na.

2.3. Implementation Phase

During the project formation workshop in April, 2009, a problem and needs assessment was undertaken. This workshop was attended by all key participants, that were committed to contributing to the HORTIN program. Till date, sweet pepper production in Indonesia cannot fulfill demand, especially for export markets which require higher quality standards. Based on the supply requests made to the Cooperative Mitra Sukamaju in Cisarua (which lies in the hart of sweet pepper production of Indonesia), it is estimated that the export market could absorb about 100 tons of sweet pepper per month. Current production only fulfills around 20%.

One of the key constraints it the low level of productivity with farmers at about 2,5 kg/plant and only 50% is produced at export quality. Based on supply chain analysis, conducted both in the workshop on April, 17 2009 and through observation, low production capacity is caused by three factors. Firstly, watering technique which is currently used is not optimal. Secondly, the current bamboo greenhouse construction is causing loss of sunlight. Thirdly, Standard Operational Procedure (SOP) management practice is not adopted yet by farmers in their cultivation practice.

Increasing the production capacity can be done through improving technology and good watering system (fertigation), greenhouse construction and implementation of good agricultural practice. However gaining access to these production improving technologies is still a problem faced by the small farmer, due to lack of availability of capital for investment. Also,

implementation of good agricultural practices is likely to give benefits to farmers in their production results. Moreover, there has been no standard form available.

Problems faced in the sweet pepper supply chain, firstly is the inability of farmers to access credit facilities from banks because they do not have collateral. Credit facility is required to improve the farmers' cultivation technology that is now in order to more productivity and quality increases. Secondly, economically this sweet pepper farming is profitable for farmers if the farm is managed correctly in both aspect financial management as well as farm management. For instance, farmers do not separate the business financials from the day to day needs of their households. In the farm management, the farmers have also not been implementing good agricultural practice over SOP. Thirdly, there is no certainty contract between farmers and buyers. The farmers are not able to fulfill export demand in terms of volume and consistency of volume, because farms are not managed according to a production plan.

The following needs were determined in the workshop relating to:

- Product Quality
 - a. Implementation of Good Agricultural Practices (GAP)
 - b. SOP

- Access to Credit:
 - a. Timely payment
 - b. Credit for covering operational costs
 - c. Risk bearing capital

- Product Marketing:
 - a. Stable prices to growers
 - b. Continuity of supply, based on commitment between buyers and supplier.

- Productivity Increase
 - a. Increase production with existing land
 - b. Improved productivity results in rain season, due to lack of light

After the needs assessment the following arrangements were made with the project implementation consortium. Through a separate discussion with the stakeholders such as the Emerald Trading as exporter, Rabobank International Indonesia Branch Bandung, sweet pepper farmers who and represent cooperatives Mitra Sukamaju and Familiy Farmers producer Group in Cisarua, finally reached an understanding with that, to overcome the constraint mentioned above there must be cooperation between the various parties that have a similarity of interest. For this purpose an agreement has been produced to create a pilot project involving sweet pepper farmer, exporter and financial institutions. In this pilot, Rabobank branch Bandung will provide financing facilities to farmers for the development of the greenhouse with a wood-metal construction, installation of drip irrigation and working capital. Emerald Trading (exporter) will take responsibility as avalist (guarantor) and will receive the production, while the HORTIN team will perform transfer of knowledge based on the results of technical research that has been done and help the implementation of GAP/SOP. Pilot supply chain paprika this example and will be open for all parties to learn from the pilot.

2.4. Activity plan

The workshop led to the following activity plan. This activity plan was implemented since the beginning of 2010. This activity plan roughly provides the outline for the evaluation, which will be presented in the next chapter.

Table 2. Activity Plan for the HORTIN II Sweet Pepper project

No	Actions	Participants				2009				2010			
		H	E	R	G	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Calculation of investment on wooden-metal plastic house, drip irrigation and sweet pepper export production	x	x		X								
2	Loan or credit calculation			X									
3	Survey on locations for plastic house and drip irrigation construction	x	x	X	X								
4	Construction of wooden-metal plastic house and installation of drip irrigation	x	x		X								
5	SOP refresher and business plan trainings	x	x		X								
6	Sowing	x	x		X								
7	Pre-transplanting meeting for all pilot study participants	x	x	X	X								
8	Plastic house transplanting preparation	x			X								
9	Transplanting	x	x		X								
10	Monitoring and evaluation	x											
11	Regular bi-weekly meeting before transplanting	x	x	X	X								
12	Regular bi-weekly meeting after transplanting	x	x	X	X								
13	Finishing harvest	x	x		X								
14	Seminar to discuss results; lessons learned and sharing of experiences with relevant stakeholders from MOA and private sectors	x	x	X	X								
15	Completion report	x											

H= Hortin Team, E=Exporter R=Rabobank G=Grower

3. Evaluation Focus and Evaluation Logic Model

As the introduction mentioned, the process leading to implementation of the Hortin II sweet pepper program was shrouded in layers of complexity. Therefore a participative approach, involving all implementation stakeholders, was adopted to obtain clarity in terms of the activities undertaken and the intended outcomes of those activities. The participative approach was executed in a workshop setting involving all local implementation partners. International partners, who couldn't be present at that moment, were asked to individually provide their input at a later stage.

The participative approach contains two steps:

1. to obtain the overview of the actual implementation activities and the intended outcomes of those activities.
2. to define the evaluation questions together with the implementation partners.

In preparation to the workshop, the evaluator compiled an extensive logic model of the project, based on interviews with the project implementation partners. This was supplemented with a review of the initial project proposal and the mission reports provided by the implementation partners (model in Annex 2a). This logic model was discussed as a first step to the workshop. The discussions resulted in amendments to the first project logic model (amended version can be found in Annex 2b).

For the second step, the Kellogg Foundation's (2008) "Logic Model Development Guide"¹ was used. It contains a specific process description for using the intended audience of the evaluation report as a source for defining the evaluation questions and defining the indicators which are relevant to obtain answers (chapter 4). The questions which were defined by the participants are included in Annex 3.

Based on the results of the workshop, the evaluator reduced the extensive logic model. This reduction was made to focus only on evaluating the main determining mechanisms behind the effects, which the project set out to achieve, as well as their causal ordering. The evaluation questions (and relating indicators) from the workshop were then applied to the evaluation logic model to define the determining mechanisms and show how they could be measured and their effects be verified. The result of reducing, and integrating the logic model with the evaluation questions is portrayed in figure x of the evaluation logic model below. The evaluation was conducted, based on this model².

¹ <http://www.wkkf.org/knowledge-center/resources/2010/Logic-Model-Development-Guide.aspx>

² Note that not all of the 14 questions, defined as evaluation questions in Annex x, have been addressed in the evaluation logic model. Questions 9 and 12 were integrated with 5 and 6 respectively. Questions 10 and 11 will be treated in the discussion chapter (3). Lastly question 13 is integrated with question 2.

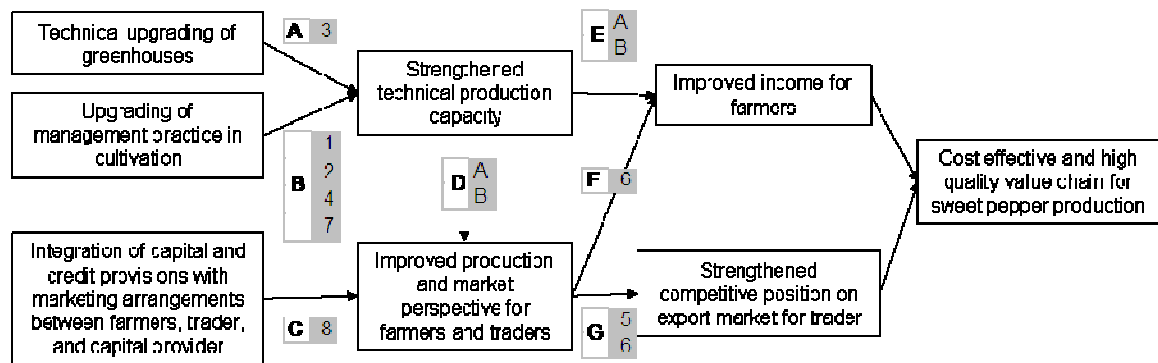


Figure 1. Reduced Logic Model used for the Evaluation. Arrows indicate causal relationship. Each relationship (represented by a letter A – G) is defined by the evaluation questions as defined in the workshop (Annex 3)

4. Results of the Evaluation

This chapter will follow the alphabetical order belonging to the causal relations as portrayed in figure 1. The questions used to explain each causal relation, are mentioned in Annex 3. The evaluation of each causal relationship will be supported by a description of the method and information source used. It should be noted up front that it was not possible to draw statistically representative conclusions from the data gathered during the course of the project. This is due to a lower than foreseen participation of only two farmers in the Hortin project.

Link A.

The technical upgrading of the greenhouses is expected to lead to a strengthened production capacity.

Method

1. Productivity is compared between the two new wood/metal green houses, and the conventional bamboo green houses. (Question 3)

Indicator and information source

1. Productivity was expressed in kg. yielded fruit/plant over one production cycle

The source of information is the farm record, which is kept by the participating farmers

Result and interpretation

Production per plant of new wood-metal greenhouse till the end of September 2010 is 3.7 for farm A and 3.0 for kg for farm B, meanwhile production of conventional bamboo greenhouse is 1.0 kg. and 2.3 kg. According to the farmer's experiences, they claim that average production per plant for the bamboo greenhouse is usually 2 to 2.5 kg. Wood-metal greenhouse has more light inside the greenhouse compare to bamboo greenhouse. Unfortunately, during this pilot implementation it was lot of rain around June till August. This condition has influence to the plant productivity both for new wood-metal and bamboo greenhouses. However, production per plant of new wood-metal greenhouse higher compare to bamboo greenhouse although harvesting time has not ended yet as show in table 3.

Table 3. Comparing productivity between wood-metal and bamboo greenhouses

	New wood-metal		Bamboo	
	A1 ¹	B1 ¹	A2 ²	B2 ³
Acreage (m ²)	1.344	1.200	1.000	1.200
Number of plant	3.850	3.640	3.450	4.500
Total Production (KG)	14.219	10.943	3.498	10293
Production (kg/plant)	3.7	3.0	1.0	2.3

1 = Harvesting period April till September, 2 = Harvesting period May till September 3= Harvesting period March till Oct.

By using wood-metal greenhouse inside the greenhouse get more light that need for photosynthesis and fertigation system support to plant growth with appropriate supply of water and nutrients, in that way production capacity can be strengthened, each square meter can produce 1.5 or 2 time more volume.

Link B.

Upgrading of management practice in cultivation was expected to contribute to a strengthened production capacity.

Method

The relationship was assessed, based on 4 aspects:

1. The price of exported peppers from the wood/metal green house is compared with the price commanded by the peppers from the bamboo green house, sold to the domestic market. (Question 1)
2. Input costs are compared between the wooden/metal green house and the bamboo green house. (Question 2)
3. Production costs are compared between the wooden/metal green house and the bamboo green house. (Question 4)
4. Based on interviews with the farmers, a qualitative assessment is made of opinion regarding the contribution of satisfaction with the training to strengthening management capacities (Question 7)

Indicator and information source

1. Average price per color grade (red/yellow/green)/kg yield, produced by wooden/metal greenhouse and bamboo green house
2. Input costs (consisting of seed, fertilizer, pesticides and/or predators, labor)/kg yield are compared between the wooden/metal green house, and the bamboo green house.
3. The production costs (Input cost + repayment loan and interest)/kg yield are compared between the wooden/metal green house, and the bamboo green house
4. Learning and satisfaction is assessed by asking the participating farmers to:
 - Rate the instructor (scale of 1-4) bad – enough – good –very good
 - Rate the trainings and support (scale of 1-4) bad – enough – good –very good
 - Estimate how much they have learned in the course (mentioning at least 3 and at most 10 lessons learned from the training which are incorporated in everyday work in the greenhouse)

For 1-3. the source of information is the farm record, which is kept by the participating farmers

For 4 the source is the result of the questionnaire included below

Result and interpretation

1. Average price per color grade.

Price for export either from new wood-metal greenhouse and conventional bamboo greenhouse are fixed price. This fixed price is determined by putting a margin of 30% on top of the estimated cost of production in the wood-metal green houses. Price of sweet pepper are IDR 9.000,- for green, IDR 10.000,- for red and IDR 11.000,- for yellow. In this pilot project, all of export quality that produced from wood-metal greenhouse were sent to exporter with fixed price. Produce which does not fulfill export quality, is sold on the local market. It should be noted that the area of Cisarua, where the HORTIN II project took place, is the only sweet pepper production region in Indonesia. This creates a situation where price information is transferred easily, and responds rapidly to changes in supply. Prices for local either from new

wood-metal and conventional bamboo greenhouse can therefore fluctuate strongly, depending on total production of whole farmers in surrounding production area. During pilot project implementation, production went down due to long period of rainy season, June till August 2010. Therefore prices were very high (see column 3, table 4), compared to more regular prices (column 4 table 4) Average prices at local market per kg are IDR 9.226,- for green, IDR 17.000,- for yellow and IDR 19.154,- for red

Table 4. Comparing of Average Price per color for export and domestic markets

Color	Export Market ¹	Domestic Market ²	Domestic Market ³	Production Cost+30% margin ⁴
1	2	3	4	5
Green	9.000,-	9.226,-	7.967,-	-
Red	10.000,-	19.154,-	10.400,-	-
Yellow	11.000,-	17.000,-	11.300,-	-
Average	10.000,-	15.127,-	9.889,-	10.837,-

¹fix price for export quality on contact basis with exporter

²average price during April till September 2010

³average price during January till October 2008 (source: Cooperative MSM)

⁴average production Cost plus 30% margin

Improving of management practice in cultivation has effect to strengthened of production capacity but there is no direct impact to average price for export market because fix price is applied. The fixed price is comparable to the average local market price. The main advantage farmers would have for the export market, is that this market channel comes with a sales guarantee. It should be noted that some produce from wood-metal greenhouse of farm B were sold to domestic market due to damaged by pest *Thrips sp.* This damaged product was not deemed fit for the export market, but conversely commanded a higher price on the domestic market.

2. Input Cost

Input costs consist of seed, fertilizer, pesticides, electricity, water, and growing media. To compare input cost between new wood-metal greenhouse and conventional bamboo greenhouse, percentage of each input cost against total variable cost is used. Also a comparison is made on the averages per kg yield. Total variable cost of new wood-metal greenhouse of Farm A is IDR 59.259.615,- and total variable cost of conventional bamboo greenhouse is IDR 25.096.500,-. Total yield of new wood-metal greenhouse is 14.219 kg and conventional bamboo greenhouse is 3.498 kg. Table 5 and figure 2 show that conventional bamboo greenhouse requires a relatively higher input cost than the wood-metal greenhouse.

Table 5. Comparing of input cost (IDR/kg yield) between wood- metal and bamboo greenhouse at Farm A.

No	Input	Wood- Metal greenhouse		Bamboo greenhouse	
		Cost/kg	%	Cost/kg	%
1	Seed	556,-	13,3	1.608,-	22,4
2	Fertilizers	2.462,-	59,1	3.049,-	42,5
3	Growing Media	326,-	7,8	964,-	13,4
4	Chemical	722,-	17,3	1.458,-	20,3
5	Electricity	89,-	2,1	50,-	0,7
6	Water	13,-	0,3	46,-	0,6
	Total	4.168,-	100	7.175,-	100

Total input cost of wood-metal greenhouse is IDR 59.259.615,- and bamboo greenhouse is IDR 25.096.500,-
 Input cost of each kilogram of produce for wood-metal greenhouse much cheaper than bamboo greenhouse as show in table 5 and graphic in figure 2. This contributes strongly to the increase in productivity. The strong reduction in costs realized also positively impacts the eco-efficiency of the production system, save for the use of electricity.

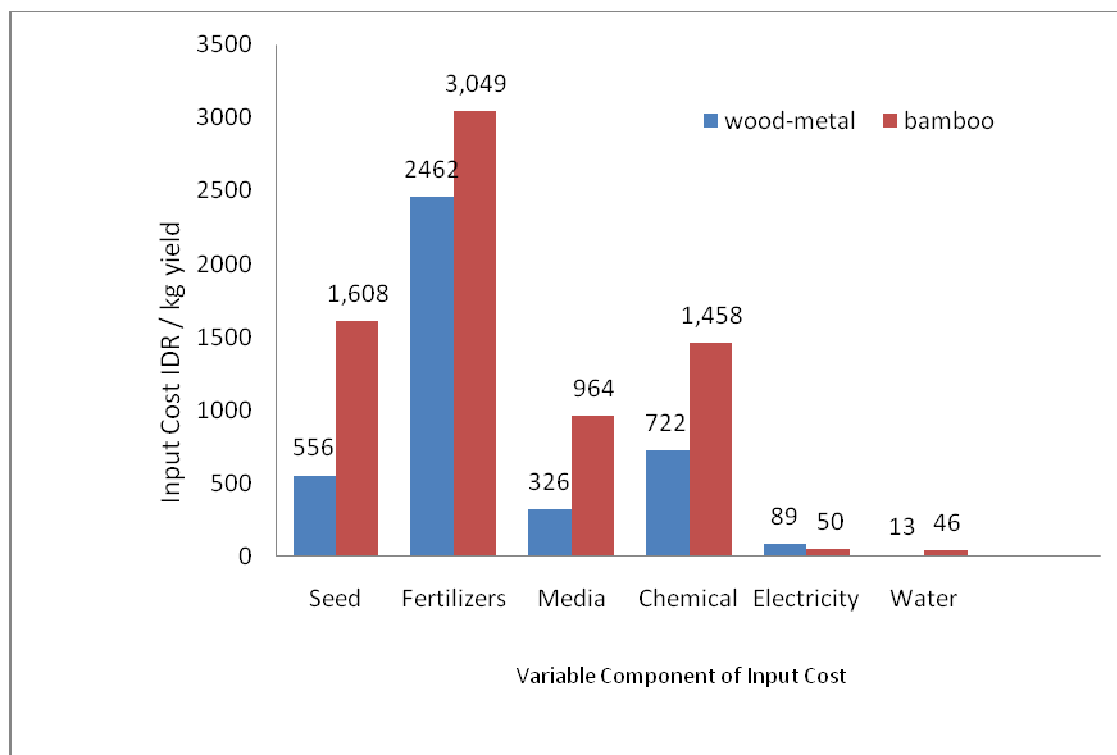


Figure 2. Comparing of input cost (IDR/kg yield) between wood-metal and bamboo greenhouse Farm A

3. Production Cost

Production cost consists of variable cost, fix cost and interest of loan. Production cost/kg yield of new wood-metal greenhouse is IDR 8.038,- and IDR 8.365, respectively for farm A1 and B1. Production cost for conventional bamboo greenhouse is IDR 13.393,- and 7.073. Production cost of new wood-metal greenhouse is not much different compare to bamboo greenhouse. Tabel 6 show that bamboo greenhouse A2 has highest production cost, but its' harvesting period started on May and will be finished later in November or December. Based on data the B2 bamboo greenhouse, production cost is IDR 7.073,-/kg. Comparing the production costs thus show mixed results, as farm B2 was able to achieve high production.

Tabel 6. Comparing the production cost of wood-metal and bamboo greenhouse

	New wood-metal		Bamboo	
	A1 ¹	B1 ¹	A2 ²	B2 ³
Acreage (m ²)	1.344	1.200	1.000	1.200
Number of plant	3.850	3.640	3.450	4.500
Variable Cost (IDR)	59.259.615	43.526.084	25.096.500	36.367.500
Fix Cost (IDR)	55.275.946	50.971.749	21.911.111	36.440.000
Production (KG)	14.219	10.943	3.498	10.293
Production Cost / kg	8.038	8.635	13.438	7.073
Harvesting period (month)	6	6	5	8

4. Training Assessment

A qualitative assessment is made of opinion regarding the contribution of satisfaction with the training to strengthening management capacities, 8 farmers have been interviewed.

How easy participants to understand the training's content (knowledge or skill) and capability of participants to implement what they have obtained (lesson learnt) from the training that has been delivered by instructors are measured as quantitative scale as show in table 7.

Table 7. Capability of training instructors in delivering knowledge or skill and implementation of the lesson learnt after training.

No.	Quantitative Scale	How did instructor deliver knowledge to the participants	Implementation of the lesson learnt
1	Bad	0 %	0%
2	Enough	12.5%	25.0%
3	Good	17.5%	37.5%
4	Very Good	50.0%	37.5%

1= bad 2= enough 3= good 4=very good

Training participants can understand the topic easily, it shows in table 7 that 50% participants interviewed expressed very good, 17,5% is good and 12.5% is enough. It means transfer of knowledge by the researcher to the farmers have been done very well, fit to "farmers language".

How far participants able to implement what they have learnt from the training, 35.5% of participants able to implement it very good, 37.5% is good and 25% is enough. These percentage reflects that topic in the training is very much relevant and meet to expectation of the farmers as participant.

Besides rating the course material and the trainers, participants were also asked to list and rank the most important learning points from their training. The result is shown in table 8.

Table 8. The most learned from the training which are incorporated in everyday work in the greenhouses

Farmer's code	Lesson learnt		
	1	2	3
1	Scouting	Pesticides use	Importance of EC
2	Pruning	Measuring EC	Spraying
3	Pruning and fruit setting	Importance of EC	Pesticides use
4	Knowledge of EC and pH	Pruning	Spraying and use of pesticides
5	Pruning	Measuring EC	Spraying
6	Fruit setting	EC maintain	Scouting
7	Spraying	Pruning	Scouting
8	Pest and Diseases Control	Pruning	Use of fertilizes

From table 8, the most learned from the training which are incorporated in everyday work in the greenhouses are listed as following:

1. Pruning
2. Use of pesticides
3. Spraying
4. Scouting
5. Fruit Setting
6. Importance of EC
7. Measuring of EC
8. EC and pH knowledge
9. Pest and diseases control
10. Use of fertilizers

Notably, farmers rank the knowledge obtained relating to plants management the highest. To a lesser degree they value knowledge relating to pest management. In light of the *Thrips* infestation in farm B1, this could indicate that more attention could have been paid to pest management, to improve the productivity.

Link C.

The integration of capital and credit provisions with marketing arrangements between farmers, their trader, and a capital provider will create improved market perspectives for farmers and traders.

Method

1. A contract satisfaction assessment, based on Schrader (undated) is made between the farmers and the trader. (Question 8)
2. Semi-structured interviews are conducted with the 7 farmers, that weren't selected for participating in the program.

Indicator and information source

1. Satisfaction is assessed with farmers and the traders, according to levels of their agreement with the most important terms of the contract
2. Interviews is address to find out the reason why do farmers object to provide collateral.

For 1 the source is the result of the questionnaire included in Annex x

For 2 Checklist of Question has been used to interview farmers to find out the reason why do farmers object to provide collateral, included in Annex 5.

Result and interpretation

4. *A contract satisfaction assessment*

As part of the strengthening of the commitment between the farmers and the exporter a Memorandum of Understanding was drafted between the stakeholders to the transaction of the sweet peppers (Annex 6). These were:

- the farmers supplying the product,
- the exporter buying and marketing the product as well as providing credit guarantees for inputs and investment capital, and

- the bank channeling the financials relating the transaction and extending the credit for investing in the greenhouse.
- the HORTIN research team, providing technical assistance to the farmers

The arrangement between these parties is depicted in figure 3 below.

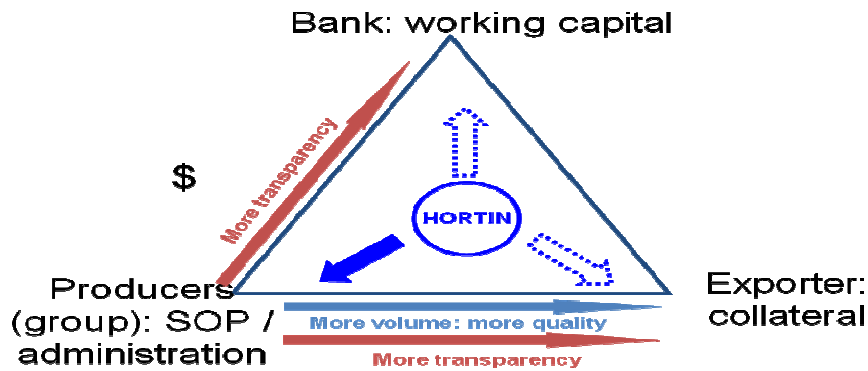


Figure 3. Triangle relationship between farmers, exporter and the bank with the supporting of the HORTIN team

The MoU contained the terms as displayed on the left of the table 9 below. The table 9 also indicates the parties that are directly involved to each of the terms in the contract.

Table 9. Terms to the Memorandum of Understanding in the HORTIN II Sweet Pepper project and the parties directly relating to the terms.

	Farmers	Exporter
1. Access to credit		
• Guarantee function	X	X
• Input credit provided	X	X
• Provision of collateral	X	
2. Timely payment		
• Release of funds upon delivery	X	X
3. Product pricing method		
• farmer will get price at least 30% of production cost	X	X
4. Transparency		
• Registry of all harvested produce in farm record	X	X
• Registry of all used pesticides (type and quantity)	X	X
• Exclusive supply of all export-grade produce	X	X
• Financial bookkeeping	X	X
5. Contingency mitigation clause		
• Pricing	X	X
• Off-grade quality	X	X
6. Technical Assistance		
• Provision of guidance in application of SOP standards	X	

The following shows the results of the contract questionnaire to the parties involved. Positive result indicated level of agreement with the terms of the contract. Negative results indicate the level of discontent.

Access to credit

Farmers agree that guarantee from the buyer help them to make investment for new type of greenhouse and open the business opportunity. Same as farmers, exporter agree that access to credit has opened new business opportunities (Questions 1-3).

Farmers disagree with the statement that farmers have sufficient seeds, fertilizers and pesticides available at the right time as outcome of the contract. The contract does not influence enough the availability of the input, especially for fertilizers and pesticides. Opposite to the farmers, the buyer agrees with the statement that farmers have sufficient input although that is not provided by exporter as credit facilities.

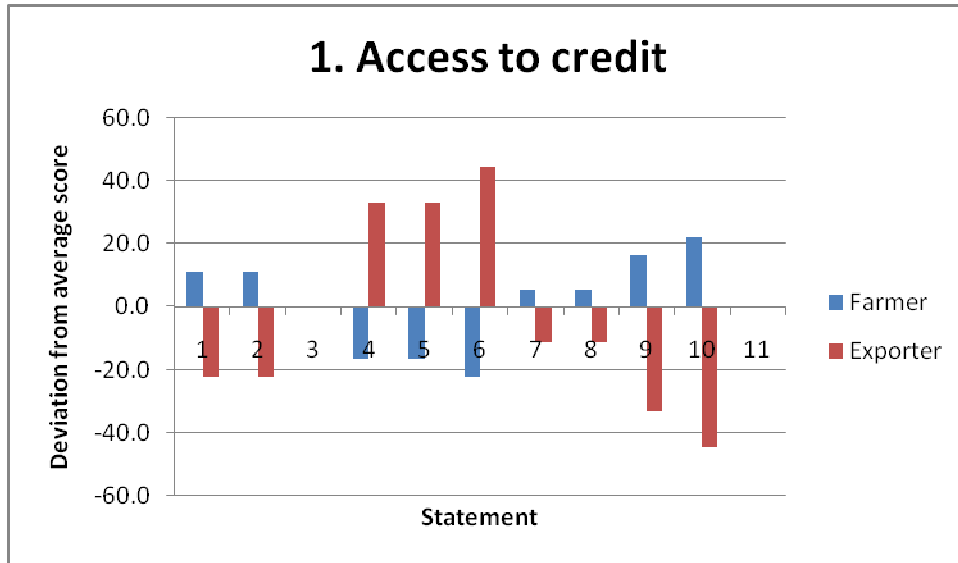


Figure 4. Perception of the farmers and exporter relating to the access to credit towards the financial arrangement.

Timely Payment

Farmers disagree to the statement that farmers satisfied with the speed of the payment of their produces. Exporter has different opinion to this statement, exporter strongly agree to this statement (question 1).



Figure 5. Perceptions regarding timely payment, between farmers and the exporter

Product Pricing Method

The pricing method shows that the exporter has other expectation regarding the delivery of the product, than the farmers (question 2).

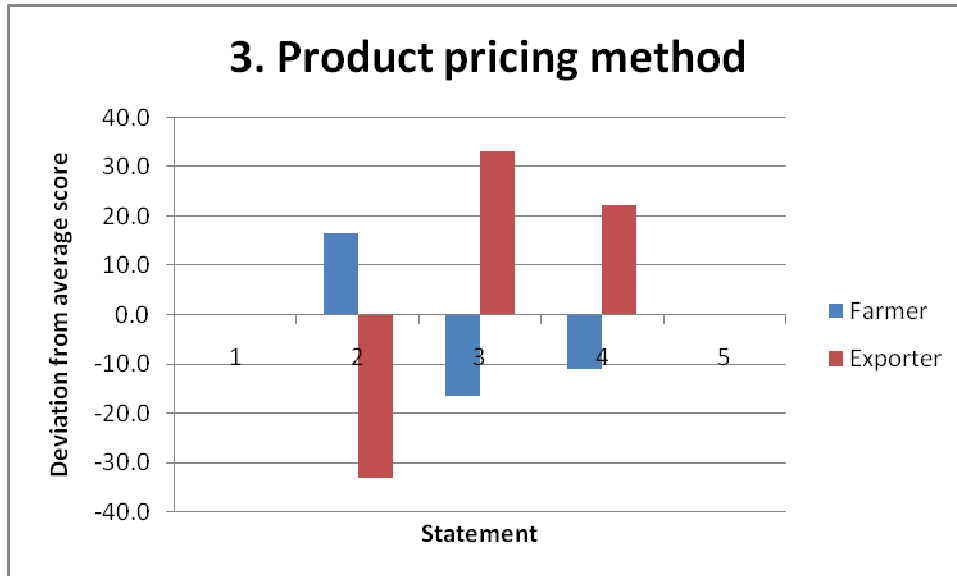


Figure 6 Perceptions relating to the product pricing method of the contract, between the farmer and the exporter

Transparency

Exporter has positive perception to the record keeping except to the statement that record keeping purpose to fulfill credit facilities (question 7). Different perception from the farmers point of view.

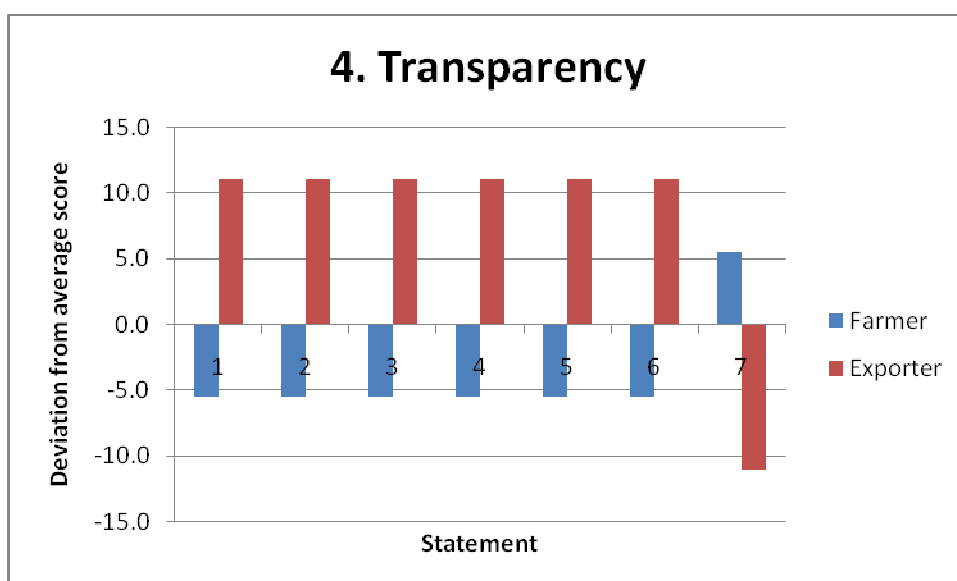


Figure 7 Perception regarding the mutual transparency in the relation between farmers and the exporter.

Contingency Mitigation Clause

Between farmers and exporter have different perception to the question 1 where farmers feel free to discuss regarding to the pricing rather than exporter.

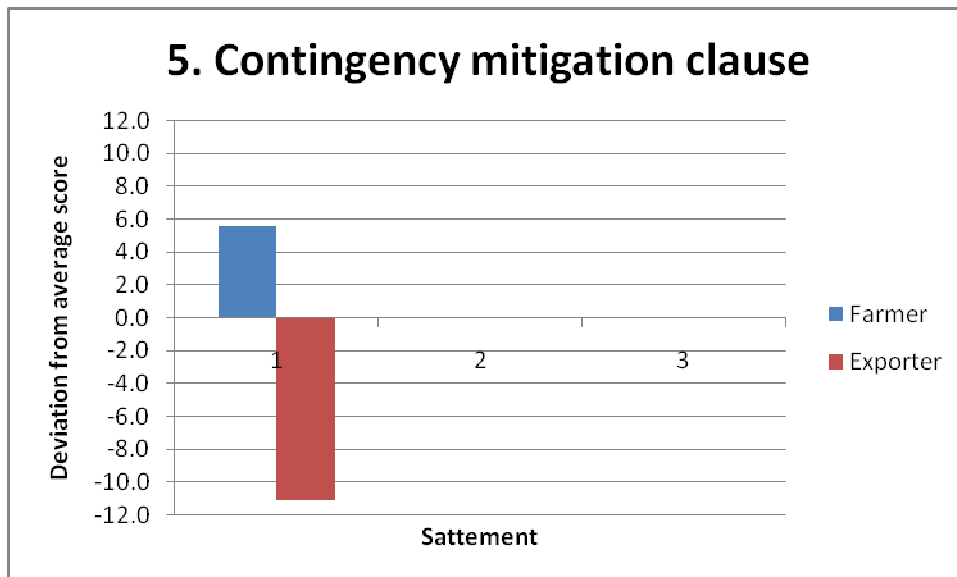


Figure 8 Perception regarding the contingency mitigation clause in the relation between farmers and the exporter.

Technical Assistant

Famers happy with the technical support have been given to them, but the exporter has different perception.

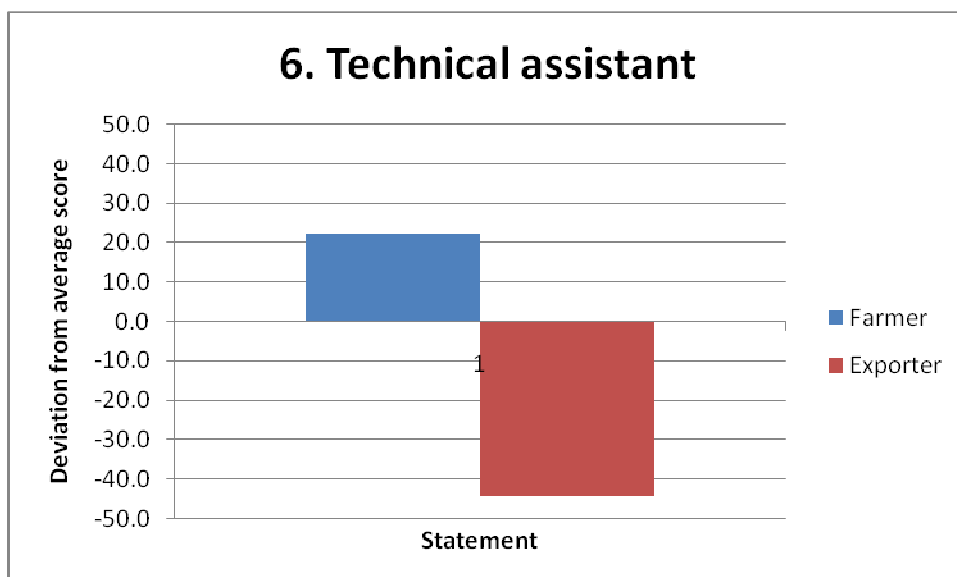


Figure 9 Perception regarding the technical assistant in the relation between farmers and the exporter.

Link D.

Strengthening technical production capacity contributes to an improved production and market perspective for farmers and traders. It is assumed that the contribution made of relation A and B, provide enough insights into link D. No separate assessment method is needed.

Link E.

Strengthened technical production capacity contributes to improved income for the participating farmers. As with link D, it is assumed that relations A and B will provide enough insight to indicate whether the wooden/metal green houses increase farmers' income. It was otherwise not possible to attribute increases in farmers' income to either the wooden metal green house, or the bamboo green house.

Link F.

Improved production and market perspective for farmers will result in improved income for farmers.

Method

1. The costs-effectiveness is assessed of the investment in the wooden/metal greenhouse and compared to the bamboo green house

Indicator and information source

1. Return on investment is calculated, based on the actual production results during the first production cycle.

The sources for calculating the ROI are the investment calculations provided by the bank and the farm records, where production is registered by the participating farmers.

Result and interpretation

	B1	A1
Acreage (m2)	1,200	1,344
Number of plant	3,640	3,850
Production (kg)		
- Green	2,586	4,859
- Red	6,098	7,273
- Yellow	2,259	2,087
Total	10,943	14,219
Production / Plant (kg)	3.0	3.7
Production Cost (Variable + Fix, IDR):	94,497,833	114,535,561
- Variable Cost	43,526,084	59,259,615
- Seed	7,900,000	7,900,000
- Fertilizers	24,634,000	35,010,120
- Growing Media	5,055,000	4,635,000
- Chemical	4,277,084	10,267,495
- Electricity	1,480,000	1,267,000
- Water	180,000	180,000
- Fix Cost	50,971,749	55,275,946
- Security	2,250,000	2,700,000
- Labour	7,290,000	9,000,000
- Depresiation of GH (EL= 10 years)	12,588,065	13,300,050
- Depresiation of Drip Irrigation	10,101,475	10,526,350
- Bank Interest	18,742,209	19,749,546
Production Cost (idr/kg)	8,635	8,055
Export Price (idr/kg)		
- Green	9,000	9,000
- Red	10,000	10,000
- Yellow	11,000	11,000
Revenue (IDR) export		
- Green	8,127,000	27,889,048
- Red	45,610,000	72,730,000
- Yellow	20,009,000	22,957,000
Jumlah	73,746,000	123,576,048
Revenue (IDR) local		
- Green	15,158,857	-
- Red	18,621,681	-
- Yellow	8,885,858	-
Jumlah	42,666,396	-
Total Revenue	116,412,396	123,576,048
Profit	21,914,563	9,040,487
Profit Margin (profit/total production cost)	23.2%	7.9%

Asset B1	Initial Value	Depreciation	Present Value
Greenhouse	167,840,870	12,588,065	155,252,805
Drip Irrigation	40,405,900	10,101,475	30,304,425
Total Asset	208,246,770	22,689,540	185,557,230
Net profit	21,914,563		
ROI	11.81%		
ROI = Net profit/Asset			
Asset A1	Initial Value	Depreciation	Present Value
Greenhouse	177,334,000	13,300,050	164,033,950
Drip Irrigation	42,105,400	10,101,475	32,003,925
Total Asset	219,439,400	23,401,525	196,037,875
Net profit	9,040,487		
ROI	4.6%		

The results of the Return on Investment show that there is variation in result between the two wood-metal greenhouses. The production of B1 was considerably lower than for A1. This was the result of thrips infestation in that greenhouse. Even under the overall adverse production circumstances, due to lack of light and heavy rains, the financial result from B1 is still acceptable. If the circumstances would have been better, the result would likely improve. Therefore, the investment in the greenhouse will positively contribute to the income position of the investing farmers.

Link G.

Improved production and market perspective for the trader will result in a strengthened competitive position on the export market.

Method

1. Competitive position of the peppers from the wooden/metal greenhouse will be compared to that of the bamboo green house.

Indicator and information source

1. The competitive position of the peppers is assessed on the basis of the following quality characteristics:
 - a) Price (/kg)
 - b) Quantity (kg /plant)
 - c) Quality (distribution of kg of production over local grade/export grade during the production cycle and shelf life).
 - d) Consistency in supply (fluctuation in the average quantity supplied from the green houses/ week)

Information for quality characteristics a)-c) can be obtained from the farm record. Information for d) can be obtained from the delivery slips of produce provided to the exporter.

Result and interpretation

1.a. Neutral impact during project. See link B

1.b. Positive impact. See link A

1.c. Quality in term of shelf life based on simple experiment. Produce from bamboo greenhouse stays fresh in open air for 3 days and produce from wood-metal greenhouse is 5 days. The hardness of the fruit is also tested from the various production systems. The results show that fruits from the wooden-metal greenhouse keep their hardness longer than the bamboo greenhouses.

Table 12. Hardness test of produce from wooden-metal and bamboo greenhouse.

No	Sample	Hardness/teksture – 1 day	Hardness/teksture – 6 days
		mm/dt/100 gr	mm/dt/100 gr
		%	%
1	A1 (wooden-metal; drip)	18.36	19.38
2	B1 (wooden-metal; drip)	17.76	19.47
3	C2 (bamboo; without drip)	18.26	21.12
4	D2 (bamboo; without drip)	18.69	20.48

Note:

- The lower the %, the harder as the produce
- Hardness is not as effect of the greenhouse construct but its as effect of fertigation system.

The overall conclusion from this analysis is that the greenhouse and its' technology contribute positively to competitive position of sweet pepper production.

1d. The distribution of the output of the both the bamboo greenhouse, and the wood-metal greenhouse show inconsistencies, especially for yellow and red peppers. This is contrary to what is required for a strong competitive position on the export market. The wood-metal greenhouse in itself has thus not contributed to the solution. Notably, it is more an aspect which is related to production management, than to the technological innovation.

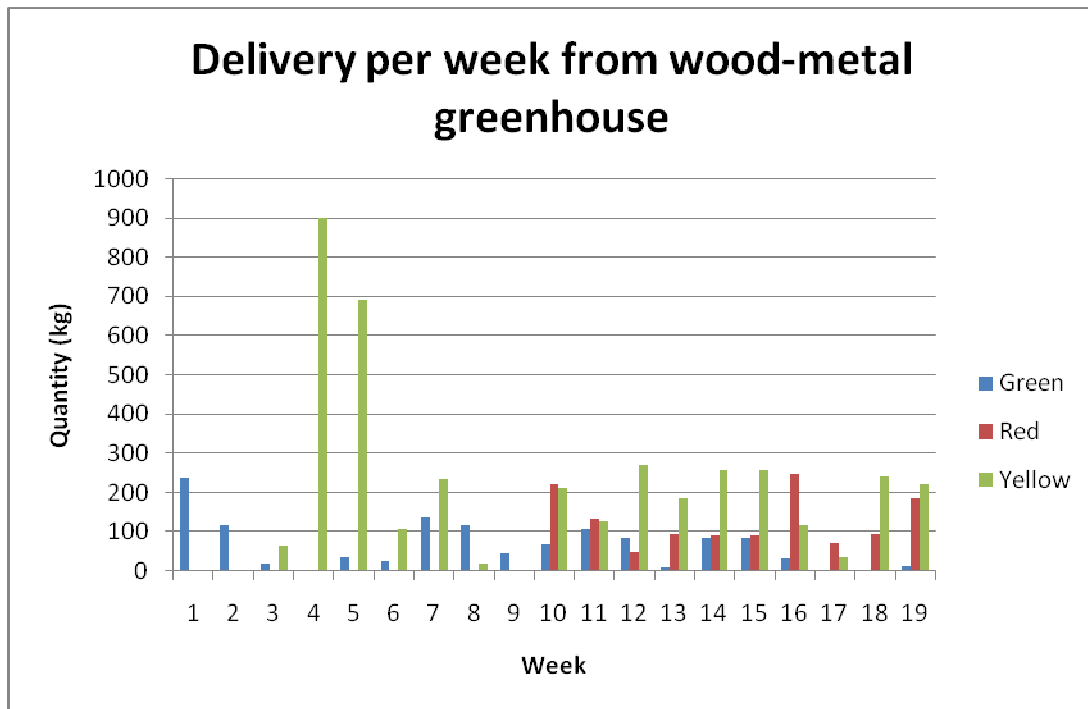


Figure 10. Delivery per week from wooden-metal greenhouse

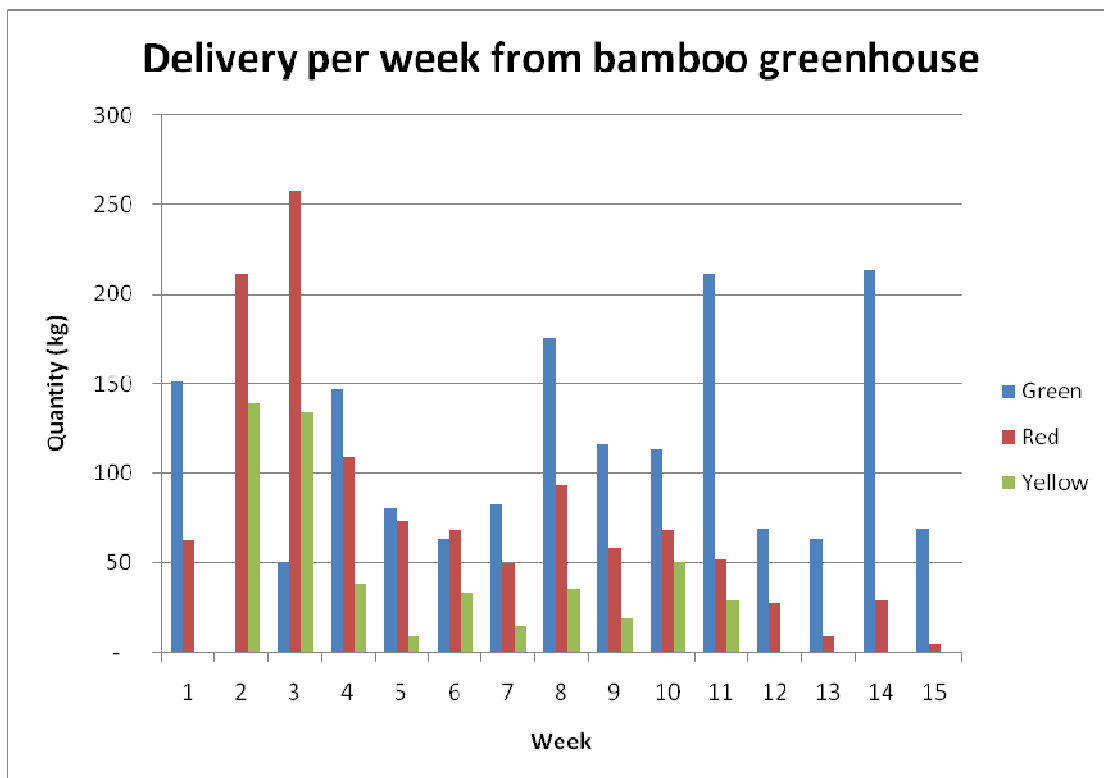


Figure 11. Delivery per week from bamboo greenhouse

5. Synthesis and Discussion

When overlooking the evaluation results of the model presented in figure 1, the following synthesis can be drawn up regarding the function of the model.

4. The wood-metal greenhouse exhibits robust technical performance to the production conditions in Indonesia.
5. The financial viability is also positive, although more attention should be paid to realizing increase of production, to cover for the initial investment costs. Notably, pest management holds strong perspectives for realizing this increase.
6. The relations behind the contract have shown to weaken under rising domestic market prices, negatively impacting the competitive position of the export chain. Also the management of supply of volume needs to become more consistent to support a stronger competitive position. The quality of the product on the other hand, has improved, and contributes to a better competitive position.

When reflecting on the wider implications to the outcomes of the HORTIN II sweet pepper project, various factors relating to the wider context in which the project was conducted, need to be taken into consideration

One of the key thresholds to access the new greenhouse technology was implicit requirement for investment capital and the lack of availability of credit (or cash for that matter), which would enable the farmer to make the investment in the technology. The largest constraining factors to this access to credit was the lack of available collateral, denominated to the lender who would invest in the greenhouse. This evokes some interesting questions as to how endemic this phenomenon actually is to farming in Indonesia, and what the effects would be to the future development of agriculture in the country. Particularly regarding the implications for developing more capital intensive production systems.

The HORTIN II project was able to come to implementation with only a limited cohort of farmers, namely those farmers, that access to collateral denominated to their name. Given this precondition, the HORTIN II model could gain scope for wider adoption if capital providers could by-pass the problem of collectively-owned family assets. One could think of hybrid finance models, where farmers would pool capital in an investment vehicle, for instance through the cooperative. This would then allow for financing constructions, which are underwritten through risk dispersion methods by pooling risk. Perhaps there would also be scope for public policy involvement to provide solutions to the risks and constraints associated with collectively-owned assets, for instance through providing public guarantees or to examining alternatives in the current system of inheritance.

The greenhouse technology has pointed out to being a sound investment. Although the investment requirement is considerable in comparison to existing technology, the technology has proven to perform in an economically sustainable manner, even under adverse conditions of lack of lighting, and thrips infestation. Particularly the impact of thrips is interesting to consider, as it is essentially a manageable condition in greenhouse production. Were additional controlling options to be provided to producers, like increased skills in pest monitoring, spraying, and use of suitable predators, the results from the new greenhouse technology could

even have been better than current. Improving of this part of production management practice will be essential keeping the economic performance at levels which provide good returns.

Regarding the market for produce, a choice was made for the production of sweet peppers in the greenhouse, and an exclusive supply arrangement to an exporting company. The results from the contracting assessment have shown that there are some open-ends to the sustainability of the terms to the contract, like the pricing arrangement. Upon price increases in the domestic market, farmers were tempted to supply outside of their contractual agreement. This points to the fact that the exporter's competitive position bears a supply risk. If uncertainties appear in the supplied volumes, the exporter stands to lose face to his clients, who need dependable sources to fill the shelves of the supermarkets.

One of the prime uncertainty-mitigating strategies for the exporter would be to control for these uncertainties through backward integration into production. The exporter would then take greenhouses into ownership and contract for the required labor. Although this construction would lose part of the entrepreneurial incentive for maximization of output of the greenhouse, the exporter could stand to gain from the trade-off from stability in the volumes supplied. Time will tell what alternative could be found to the arm's length contract which is currently in place. But it would seem fitting to concentrate on remediation of the uncertainty caused by surges in the domestic prices.

What would also remain to be seen for the future, is whether farmers will stay specialized to the production of sweet peppers. Diversification into other crops could also be interesting, as it is likely that the same production increases can be realized as with sweet pepper. Depending on the circumstances in the market, farmers will be inclined to mix their output of vegetable produce to various markets, not only the export market. The burgeoning consumer retail market in Indonesia, for instance, is destined to become a strong source for demand of higher end fresh produce. Given the constraint retailers work with at the moment in terms of local supply in Indonesia, a local alternative with export grade product and stable supply volumes would be an interesting supplying party. This would again demand a change in the orientation to which the exporter has created supply linkages. As a result, such changes in the domestic market might even encourage the exporter to work as a local trader with higher quality produce.

Given the dynamics which are touched upon in this discussion, it would be worthwhile to take on an assessment follow-up in one or two years. The assessment would then need to focus on the dissemination pattern of the greenhouse technology, and the types of markets which can be served with its' output. What this assessment would also need to show is what forms the ownership and contracting arrangements are created, relating to the greenhouse. Only after these observations have been made, can the HORTIN II model in green pepper production better be weighted upon its merit, and can the wider implications for upscaling of the model be compiled.

6. Conclusion

The HORTIN II Sweet Pepper production program has shown the importance of simultaneously working on a technical innovation in production and on the creation of conducive market environment in which production is based. Without the stability of a guaranteed market, which pays higher prices than the current domestic market, the technology would have been too much of a risk for farmers to invest in. By providing a dependable market, and supporting farmers with technical assistance on improvement of their production, the first steps were made to successful introduction of technology improvements under production and market conditions of horticulture in Indonesia.

Regarding wider adoption, a hurdle still needs to be taken regarding the provision of collateral to invest in agriculture in Indonesia. The scope for implementation of the technology within the bounds of the project, was very limited due to the constraints associated with access to collateral. This implicitly indicates that the technology is only available to a elite segment of the farming population in Indonesia, namely that part which hold assets which can back bank loans.

Aside constraints faced by the capital requirement of the greenhouse, its technical performance is robust. Even under adverse production circumstances encountered during the project, the technical performance of the greenhouse was still sound. By giving more attention to aspects of pest monitoring and control, notably through dependable access to an effective population of predators, the performance of the greenhouse could most likely improve even further. Also the management of consistency of supply of produce should be given more consideration.

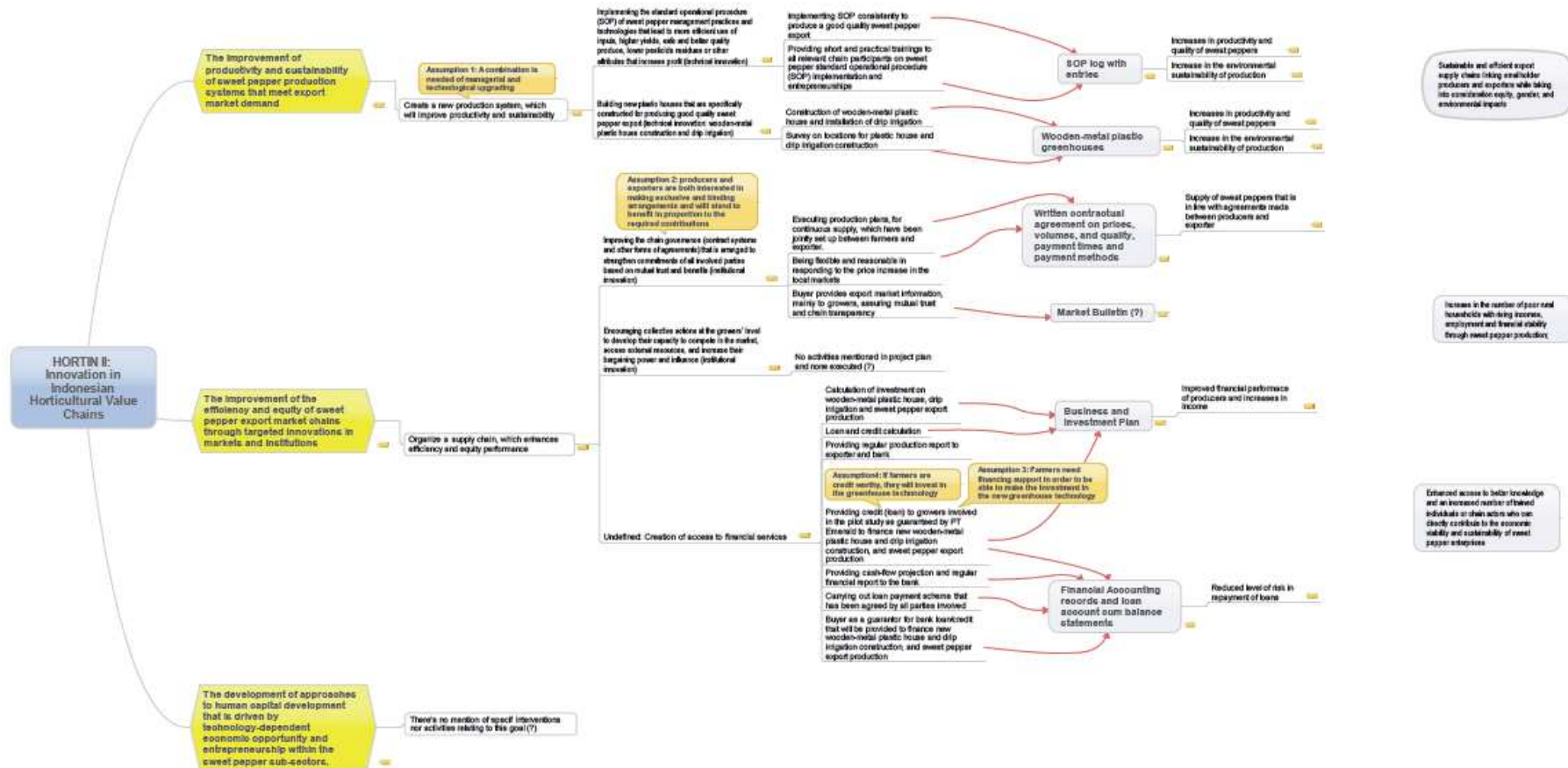
Lastly, consideration was given to the effectiveness of the contractual arrangement for selling the green pepper produce. The current contract has shown a disparity between its' underwriters on the terms relating to timely payment and access to credit. This indicates that the measures taken to stimulate a closer buyer supplier relation to strengthen the basis for commitment to exclusivity in supply, is under threat. In order to strengthen the relation, further discussion will be needed between the contract's underwriters to obtain better insights into their respective expectations. To a lesser extent the product pricing mechanism also shows disparity.

In all, the HORTIN II sweet pepper chain model provides a valuable learning case. The case has shown that it is possible to speed up the process of technology adoption through co-innovation between market actors, with support from researchers. However, due consideration needs to be given to the circumstance under which the innovation has taken place. Notably the strong pull on demand in the case of sweet peppers was one of the key factors, which made the introduction of the technology possible. This pull in demand will be hard to replicate under other conditions, and it remains to be seen whether the combination of a technological innovation can be backed without such a strong pull by market demand, notably on the undifferentiated domestic market for The upside is though, that if demand for high quality produce is rewarded, the novel greenhouse system holds the competitive advantage in terms of being a highly productive system and source for consistent quality and quantity of production output.

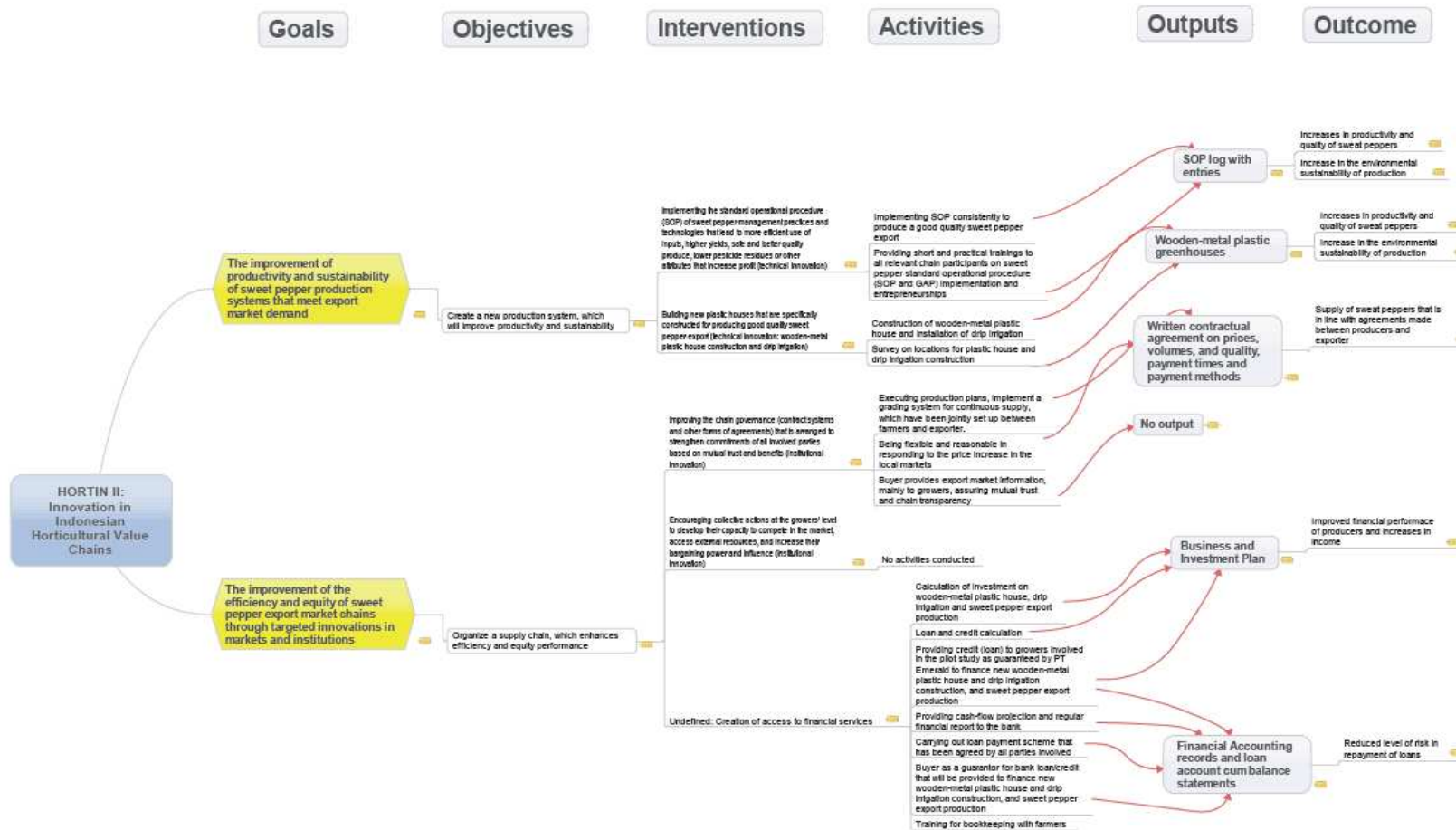
Annex 1 List of farmers, who were interested in participating in the pilot project

No.	Farmer's name	Available land can be use for new greenhouse of pilot project
1	Eman	2.500 m2
2	Agus	1.000 m2
3	Muhidin (Uper)	1.000 m2
4	Caca Handika	1.000 m2
5	Kusnadi	2.000 m2
6	Dede	1.000 m2
7	Sri	1.500 m2
Total		10.000 m2

Annex 2a Initial Logic Model



Annex 2b. Implemented Logic Model



Annex 3 Evaluation Questions

Evaluation Focus Area	Audience	Question	Reason?	Indicators	Information Source	TA needed?	Responsible for providing	Timing
Outcome evaluation	Growers	1. Do the production management interventions also command a higher price?		Average price of exported peppers from old system vs. weighted average price of exported peppers from new system.	Farm record (FR) for new system and for the old system Delivery Slips (DS)		FR: Witono will provide to Iskandar and Iskandar will transfer to excel (and translate) DS: Iskandar will coordinate with the exporter (contact Ibu Entang)	FR: Thursday 30 September DS: Thursday 30 September
		2. Do the production management interventions reduce input costs?		Input costs (seed, fertilizer, pesticides, labor) per plant of sweet pepper vs input costs in old system	Farm record for new system Survey data (SD) with Ivergri for old system		FR is same as 1. SD provided by Nikardi	Same as 1 Before September 15 th
		3. What is the productivity increase of the new		Production per plant in new system vs. old system	Farm record for new system Survey data		Same as 2	Thursday 30 September

Evaluation Focus Area	Audience	Question	Reason?	Indicators	Information Source	TA needed?	Responsible for providing	Timing
		plants compared to the old system?			with Ivegri for old system			
	Exporter	4. What is the production cost per unit of output?		The production cost per kg of sweet pepper	Farm record		Same as FR 1	
		5. Has the competitiveness of the product improved?	The marketing strategy for the product	Price (per kg) Quantity (per plant) Quality (Grading Distribution and Shelf Life new vs. conventional varieties) Consistency (av quantity per week, new vs old)	Cannot say yet Cannot say yet Gd from farm record (not in the record) and SL from seed supplier variety vs conventional variety Farm record (new) delivery slips (old)		SL: Ivegri will test locally and exporter will test as well. Witono will coordinate DS: Same as 1	Thursday 30 September
	Bank	6. What is the cost-effectiveness for farmers of their investment in the green house		ROI	Investment plan together with farmrecord with production statistics		Investment planning to be provided by Patmos (Iskandar will	Provide ex-ante investment plan asap. Preferably in

Evaluation Focus Area	Audience	Question	Reason?	Indicators	Information Source	TA needed?	Responsible for providing	Timing
		system?					coordinate)	excel
	Ivegri	7 How effective was the training intervention for SOP with the farmers?		Trainee feedback (but difficult)	Trainee interview		Witono and Iskandar will coordinate Bart could provide basic framework	Bart will deliver by August 28 Witono will provide interviews by September 30
		8. Has the project contributed to closer relations between the farmers and the exporter?		Contract satisfaction	Contract Satisfaction Assessment		Bart will provide framework Iskandar and Witono will coordinate	Results will be shared by September 30
		9. What contribution has the technological innovation made to the problem of discontinuity in supply?		Weekly supply figures before/after	Farm record during the project. And exporter supply record		Same as 1	Same as 1
	HCC	10. What is the	For	Statement from	Interviews with		Iskandar will	September

Evaluation Focus Area	Audience	Question	Reason?	Indicators	Information Source	TA needed?	Responsible for providing	Timing
		main benefit for each stakeholder from being involved in the program?	assessing alignment of interest between actors	each stakeholder	stakeholders		put together framework for analysis and conduct interviews and report	30th
		11. Which factors have most strongly contributed to the competitiveness of the supply chain?		Strongest % change of competitiveness indicators mentioned above	See indicator 5 above.		Same as 5	Same as 5
	PPO and WUR Green House Horticulture ³	No specific additions were requested. Consideration was asked though, for taking IVERGRI's learning process with this type of project into consideration.						
Dutch Min. Agr. (counselor) ¹	12. What's the benefit and cost	During recent discussion,						

³ This questions were noted after the participatory workshop was conducted.

Evaluation Focus Area	Audience	Question	Reason?	Indicators	Information Source	TA needed?	Responsible for providing	Timing
		ratio before and after technology change (dripped water system, greenhouse materials, biological control)? ⁴	the farmers informed us that there are not much incentives (revenue speaking) using newly introduced tech.					
		13. How effective the introduction of biological control in the IPM?	Farmers told us that the biological control for thrips are not effective in combating other pests. So in conclusion farmers still have problems with the pests ⁵					

⁴ This will be considered in the reflection on the investment planning (question 6). No separate indicator is needed

⁵ This questions will be answered by question 2.

Evaluation Focus Area	Audience	Question	Reason?	Indicators	Information Source	TA needed?	Responsible for providing	Timing
		14. What are the effects to employment?		Working hours per square meter	Farm record		Same as 1	

Annex 4 Questionnaire for the contract assessment

	question farmer	score farmer			
		0 I strongly disagree	1 I disagree	2 I agree	3 I strongly agree
1	<i>Access to credit</i>				
	Guarantee				
1.1	I could not have made the investment without the support from the guarantor				
1.2	The guarantee opens up new opportunities for my business				
	Input credit				
1.3	I have sufficient seed available at the right time				
1.4	I have sufficient fertilizer available at the right time				
1.5	I have sufficient pesticides available at the right time				
1.6	I benefit from not having to pay directly for my inputs				
1.7	The input company provides quick feedback when I ask them for advice if I have a problem with my crop				
1.8	I get high yields because I have sufficient know-how on how to produce the crop				
1.9	I produce high quality because I have sufficient know-how on how to produce the crop				
1.10	The price that I have to pay for the inputs are very reasonable				
	Provision of collateral				
1.11	My land is a worthwhile down payment for the investment I made				
2	<i>Timely payment</i>				
	Release of funds upon delivery				
2.1	I am satisfied with the speed of payment for my produce				
2.2	I can easily access my accounts to obtain my money				
3	<i>Product Pricing Method</i>				
	30% above cost price				
3.1	the amount and quality of produce the company wants to buy from me is clear to me				
3.2	I can easily sell my product to other buyers if I want				
3.3	I am happy with the way the company explains how they calculate the price they pay to farmers (transparency in price setting)				
3.4	the quality grades that the company uses, including the price for each grade are clear to me				
3.5	I think the company pays me a fair price				
4	<i>Transparency</i>				
	Record keeping of production				
4.1	Keeping record of all my production is useful to me				
4.2	I keep record of my production to strengthen my sales relation				
	Record keeping of pesticides				
4.3	Keeping record of all my pesticide use is useful to me				
4.4	I keep record of my pesticide use to strengthen my sales relation				
	Exclusivity in supply				

4.5	The full buying guarantee is brings stability to my business				
	Record keeping of financials				
4.6	Keeping record of all my financial income and expenditure is useful to me				
4.7	I keep record of my financial income and expenditure fulfill the conditions for my loan				
5	Contingency mitigation clause				
5.1	I feel free to discuss pricing with my buyer				
5.2	I am content with the pricing discussions				
5.3	I can easily discuss problems in my production with the buyer				
6	Technical Assistance				
6.1	The technical support has helped me achieve the quality of production which is required				

question exporter

score farmer

		0	1	2	3
		I strongly disagree	I disagree	I agree	I strongly agree
1	Access to credit				
	Guarantee				
1.1	Farmers could not have made the investment without the support from the exporting company				
1.2	Providing the guarantee opens up new opportunities for the farmers' business				
	Input credit				
1.3	I provide sufficient seed at the right time				
1.4	I provide sufficient fertilizer at the right time				
1.5	I provide sufficient pesticides at the right time				
1.6	Farmers benefit from not having to pay directly for their inputs				
1.7	The input company provides quick feedback to the farmers when they have a problem with their crop				
1.8	Farmers get high yields because they have sufficient know-how on how to produce the crop				
1.9	I receive high quality because farmers have sufficient know-how on how to produce the crop				
1.1	The prices that I have paid for the inputs are very reasonable				
	Provision of collateral				
1.11	Na.				

2	<i>Timely payment</i>				
	Release of funds upon delivery				
2.1	I am satisfied with the speed of payment for the received produce				
2.2	Transferring payment to farmers is convenient				
3	<i>Product Pricing Method</i>				
	30% above cost price				
3.1	the amount and quality of produce which the farmers can supply to me is clear.				
3.2	Farmers can easily sell to other buyers				
3.3	I am content with the pricing arrangement I have made with farmers.				
3.4	The quality grades for the product is clear.				
3.5	I pay a fair price to the farmers				
4	<i>Transparency</i>				
	Record keeping of production				
4.1	Farmers benefit from record keeping of their production				
4.2	I benefit from insights in the farm record				
	Record keeping of pesticides				
4.3	Farmers benefit from record keeping of their pesticide use.				
4.4	I benefit from insights into the use of persticides				
	Exclusivity in supply				
4.5	The full buying guarantee is brings stability to my business				
	Record keeping of financials				
4.6	Farmers benefit from keeping record of all their financial income and				

	expenditure				
4.7	Farmers keep record of their financial income to fulfill their obligations to obtaining their loan				
5	<i>Contingency mitigation clause</i>				
5.1	I feel free to discuss pricing with the farmers				
5.2	I am content with the pricing discussions				
5.3	I can easily discuss problems in my market with the farmers				
6	<i>Technical Assistance</i>				
6.1	The technical support has helped farmers to achieve the quality of production which is required				

Annex 5. Checklist of Question has been used to interview farmers to find out the reason why do farmers object to provide collateral

1. Does farmer as coop member understand the objective of the pilot study?
2. Does farmer know who are the involve partners and their role in this pilot study?
3. Why does farmer interested to involve in this pilot study?
4. Does farmer know that Rabobank has willingness to give credit facility for working capital?
5. Do farmer know that to get credit facility from Rabobank collateral is needed?
6. What is most difficult prerequisite to fulfill?
7. Beside collateral, does farmer know, that credit scheme in this pilot study mandate to the producers to delivers product to Emerald
8. Does farmer ever get credit facility from the bank and have to surrender such as collateral?
9. To get access to the credit scheme from the bank, farmer have to provide collateral, why do you object to provide collateral?
 - a. I Do not have any collateral? Explain
 - b. I have collateral but I am worry to use it and bank will take over if my business is fail.
 - c. I do not understand about collateral?
 - d. I can provide, but I do not want to
 - e. Complicated requirement
10. Does farmer know that Rabobank will help to process his/her land certification?

Resume of answer:

1. Most the them understand the objective of the pilot supply chain of sweet pepper for export.
2. Farmers know with whom they will work together but not very clear what is their role, because it will taken over by Coop.
3. Farmers interested to involve because of credit facility from Rabobank and they expected to get loan.
4. Farmers heard that Rabobank will give credit facility but some of them think that credit will be between coop and Rabobank and then they get input as credit from Coop.
5. Some farmers know that collateral is needed but some of them were not relies to collateral.
6. Financial record keeping is most difficult for the farmers beside the collateral itself.
7. Farmers do not really aware that produce from the project have to deliver to exporter, because in fact all of their produce go to coop and then coop will take responsible where the produce to be sell.
8. Few farmers member of coop ever get credit from the bank and for that they have to provide collateral.
9. Credit scheme
 - a. land ownership is not on behalf of the farmers but still belong to the family.
 - b. Some farmers confident to their business but some of them were not sure.
 - c. What is collateral, most of the farmers were not familiar with the term and the function, after it translate to the local language then they understand
 - d. Only one farmer can provide collateral but it has already use to get credit from another bank.
 - e. For most the farmers, the requirement of credit seem complicated, because they have to start from very first step such as make a land ownership on behalf himself or herself.

10. Through the technical assistant of the exporter, farmers know that Rabobank will help them to process land certificate.

Annex 6a. MoU between farmers, exporter, the bank, and the HORTIN team (translation)

DRAFT MEMORANDUM OF UNDERSTANDING

(Memorandum of Understanding)

Memorandum of Understanding is to define the principles of the terms and conditions under which the parties signed this dibawah will cooperate with each other in a pilot development of supply chain peppers for export.

1. Name: Eman Supaman

Address: Kp. Pasirlangu RT 3 / 3 Pasirlangu Village Kec. Cisarua, Bandung.

In this case, acting for and on behalf of himself, which in the memorandum of understanding is called FIRST PARTY

2. Name: Rev. Deden Amalludin

Address: Kp. Pasirlangu RT 3 / 2 Pasirlangu Kec Village. Cisarua, bandung

In this case, acting for and on behalf of himself, which in the memorandum of understanding is called the SECOND PARTY

3. Name: Komar Muljawibawa, SE

Address: Jl. Raya Pangalengan No. 486 Km. 40 377 20.5 Banjaran Bandung

In this case acting for and on behalf of PT. Alamanda TRUE MAIN hereinafter in this memorandum called THIRD PARTY

4. Name: Huey Sri Kinarsih

Address: Jl. No Aceh. 42 Bandung.

In this case acting for and on behalf of PT. RABOBANK INTERNATIONAL hereinafter in this memorandum called FOURTH PARTY

5. Name: Witono Adiyoga

Address: Jl.

In this case, acting for and on behalf of HORTIN-2 PROGRAM hereinafter in this memorandum called FIFTH PARTY

Given that:

- PRODUCER (FIRST and SECOND PARTY) wants to increase production capacity and improve cultivation techniques paprika.
- Exporter (THIRD PARTY) want to get assurance of supply of peppers for the export good quantity, quality and continuity which is manufactured by applying the GAP / SOP.
- RABOBANK INTERNATIONAL INDONESIA (FOURTH PARTY) want to do education to producers (farmers) so that business can be managed so that it becomes a professional business partners and bankable.
- HORTIN (FIFTH PARTY) want to do technology transfer of research results that have been carried out so as to improve supply chain performance paprika.

For that all the above parties hereby agree as follows:

1. The duration of the pilot supply chain

1.1. Pilot supply chain was conducted from December up to date

1.2. Greenhouse construction activities began on 1 November 2009. The schedule of activities is attached and is an integral part of this MoU.

2. Purpose and objectives

2.1. The purpose of the pilot is to transfer technology and improve the pattern of small businesses in the horticultural sector

- 2.2. The purpose of this pilot is to build an efficient supply chain peppers so that they can benefit all stakeholders (stakeholders).
3. Roles and responsibilities of each party
- 3.1. Party first and second parties respectively to provide land / - 1,000 m² and 3 x 312 m²
- 3.2. Party unity and the second party to apply the principles of GAP / SOP in the practice of cultivation of paprika in this pilot.
- 3.3. Party unity and the second party sends all the results of this pilot production of the greenhouse to a third party (exporter) at a price in accordance with ksesepakatan together. (Contract price attached and is an integral part of this memorandum.)
- 3.4. Third parties (exporter, PT. Alamanda Sejati Utama) is a guarantor for the use of fourth-party financing facilities (Rabobank International Indonesia) for the construction of greenhouses, drip irrigation installation and provision of agricultural inputs for the first and second parties.
- 3.5. Third parties (exporters) to provide information on marketing costs peppers for export to the first and the second party for the trust is established between the party unity, the second and third.
- 3.6. Fourth party (Rabobank International Indonesia) provides guidance to the first and the second way of good business management to become a bankable business.
- 3.7. Financial transactions between the party unity, the second and third parties conducted through the banking transactions at Rabobank International Indonesia, Bandung Branch.
- 3.8. Parties to the fifth (hortin) provide forms for recording the implementation of farm activities GAP / SOP
- 3.9. Parties to the fifth (hortin) provide assistance and monitoring to the party first and the second party in the application of GAP / SOP.
4. Exchange of information
- 4.1. All parties agree to cooperate in exchanging information except when there is one party which implies that the data and / or information shall be confidential and should not be disseminated.
- 4.2. Any data and / or information to be published first must get approval from each party binds to the memorandum of understanding this.
5. Settlement of disputes
- 5.1. If there is a difference of opinion shall be settled by consensus agreement between the parties disagree.
- 5.2. If the parties do not get the road between the settlement, other parties who are bound in this memorandum may be asked to arbitrate.
6. Additional
- 6.1. The things that arise in the future related to this pilot and have not been regulated in this memorandum can be added later.
- 6.2. Additional provisions set forth in the new memorandum of understanding which is the amalgamation of this MoU.
7. Attachment
- The following documents are an integral part of this MoU:
- 7.1. Timeline pilot supply chain activities
- 7.2. The contract between the party unity, the second and third agreements concerning the supply of pepper and price.
- Similarly, the memorandum of understanding is made and signed by each party in Bandung on October 2009.

Party Party I Party II III

Eman Deden Wahyudin Komar

Party Party IV V

Kwik Sri Kinarsih Witono Adiyoga

**Annex 6b. MoU between farmers, exporter, the bank, and the HORTIN team
(original in Bahasa Indonesia)**

**DRAFT NOTA KESEPAHAMAN
(MEMORANDUM OF UNDERSTANDING)**

Nota kesepahaman ini adalah untuk mendefinisikan prinsip-prinsip syarat dan kondisi dimana pihak-pihak yang bertanda tangan dibawah ini akan bekerja sama satu sama lainnya dalam pilot pengembangan rantai pasok paprika untuk export.

1. Nama : Eman

Alamat: Desa Pasirlangu Kec. Cisarua, Bandung.

Dalam hal ini bertindak untuk dan atas nama diri sendiri yang selanjutnya dalam nota kesepahaman ini disebut PIHAK KESATU

2. Nama : Deden Wahyudin

Alamat: Desa Pasirlangu Kec. Cisarua, Bandung

Dalam hal ini bertindak untuk dan atas nama diri sendiri yang selanjutnya dalam nota kesepahaman ini disebut PIHAK KEDUA

3. Nama : Komar Muljawibawa, SE

Alamat: Jl. Raya Pangalengan No. 486 Km. 20,5 Banjaran Bandung 40377

Dalam hal ini bertindak untuk dan atas nama PT. ALAMANDA SEJATI UTAMA yang selanjutnya dalam nota kesepahaman ini disebut PIHAK KETIGA

4. Nama : Kwik Sri Kinarsih

Alamat : Jl.

Dalam hal ini bertindak untuk dan atas nama PT. RABOBANK INTERNATIONAL yang selanjutnya dalam nota kesepahaman ini disebut PIHAK KEEMPAT

5. Nama : Witono Adiyoga

Alamat : Jl.

Dalam hal ini bertindak untuk dan atas nama HORTIN-2 PROGRAM yang selanjutnya dalam nota kesepahaman ini disebut PIHAK KELIMA

Mengingat bahwa:

- **PRODUCER (PIHAK KESATU dan KEDUA)** ingin meningkatkan kapasitas produksi dan memperbaiki teknik budidaya paprika.
- **EXPORTER (PIHAK KETIGA)** ingin mendapatkan kepastian pasokan paprika untuk export baik kuantitas, kualitas maupun kontinuitas yang diproduksi dengan cara menerapkan GAP / SOP.

- **RABOBANK INTERNATIONAL INDONESIA (PIHAK KEEMPAT)** ingin melakukan pendidikan kepada para produsen (petani) agar usaha dapat dikelola sehingga menjadi mitra usaha yang professional dan bankable.
- **HORTIN (PIHAK KELIMA)** ingin melakukan transfer teknologi hasil-hasil penelitian yang telah dilakukan sehingga dapat memperbaiki performan rantai pasok paprika.

Untuk itu semua pihak tersebut diatas dengan ini menyepakati hal-hal sebagai berikut:

1. Durasi pilot supply chain

- 1.1. Pilot supply chain ini dilaksanakan mulai tanggal sampai tanggal
- 1.2. Kegiatan pembangunan greenhouse dimulai tanggal 1 Nopember 2009. Jadwal kegiatan terlampir dan merupakan bagian yang tak terpisahkan dari nota kesepahaman ini.

2. Maksud dan tujuan

- 2.1. Maksud dari adanya pilot ini adalah untuk transfer teknologi dan perbaikan pola usaha kecil di sector hortikultura
- 2.2. Tujuan pilot ini adalah untuk membangun sebuah rantai pasok paprika yang efisien sehingga dapat menguntungkan semua pemangku kepentingan (*stakeholder*).

3. Peran dan tanggung jawab masing-masing pihak

- 3.1. Pihak kesatu dan pihak kedua masing-masing menyediakan lahan +/- 1.000 m² dan 3 x 312 m²
- 3.2. Pihak kesatu dan pihak kedua menerapkan prinsip-prinsip GAP / SOP dalam praktek budidaya paprika pada pilot ini.
- 3.3. Pihak kesatu dan pihak kedua mengirimkan semua hasil produksi dari greenhouse pilot ini kepada pihak ketiga (exporter) dengan harga sesuai dengan ksesepakatan bersama. (Kontrak harga terlampir dan merupakan bagian yang tak terpisahkan dari nota kesepahaman ini).
- 3.4. Pihak ketiga (exporter, PT. Alamanda Sejati Utama) menjadi penjamin atas penggunaan fasilitas pembiayaan dari pihak keempat (Rabobank International Indonesia) untuk pembangunan greenhouse, instalasi irigasi tetes dan penyediaan sarana produksi pertanian bagi pihak kesatu dan pihak kedua.
- 3.5. Pihak ketiga (exporter) memberikan informasi tentang biaya pemasaran paprika untuk export kepada pihak kesatu dan pihak kedua agar terjalin kepercayaan antara pihak kesatu, kedua dan ketiga.

- 3.6. Pihak keempat (Rabobank International Indonesia) memberikan bimbingan kepada pihak kesatu dan pihak kedua cara pengelolaan usaha yang baik sehingga menjadi usaha yang *bankable*.
- 3.7. Transaksi keuangan antara pihak kesatu, pihak kedua dan pihak ketiga dilakukan melalui transaksi perbankan di Rabobank International Indonesia Cabang Bandung.
- 3.8. Pihak kelima (hortin) menyediakan *form-form* untuk kegiatan *farm recording* pelaksanaan GAP / SOP
- 3.9. Pihak kelima (hortin) memberikan asistensi dan monitoring kepada pihak kesatu dan pihak kedua dalam penerapan GAP / SOP.

4. Pertukaran informasi

- 4.1. Semua pihak sepakat untuk bekerja sama dalam bertukar informasi kecuali apabila ada salah satu pihak yang mengisyaratkan bahwa data dan/atau informasi dimaksud bersifat *confidential* dan tidak boleh disebarluaskan.
- 4.2. Setiap data dan/atau informasi yang akan dipublish terlebih dahulu harus mendapat persetujuan dari setiap pihak yang terikat dalam nota kesepahaman ini.

5. Penyelesaian perselisihan

- 5.1. Apabila terjadi perbedaan pendapat maka harus diselesaikan secara musyawarah mufakat antar pihak yang berbeda pendapat.
- 5.2. Apabila antar pihak tidak mendapatkan jalan penyelesaian, pihak lain yang terikat dalam nota kesepahaman ini dapat diminta untuk menjadi penengah.

6. Tambahan

- 6.1. Hal-hal yang timbul dikemudian hari berkaitan dengan kegiatan pilot ini dan belum diatur dalam nota kesepahaman ini dapat ditambahkan kemudian.
- 6.2. Ketentuan tambahan dituangkan dalam nota kesepahaman baru yang merupakan penggabungan dari nota kesepahaman ini.

7. Lampiran

Dokumen-dokumen berikut ini merupakan bagian yang tak terpisahkan dari nota kesepahaman ini:

- 7.1. Timeline kegiatan pilot rantai pasok
- 7.2. Kontrak antara pihak kesatu, kedua dan ketiga perihal pasokan paprika dan kesepakatan harga.

Demikian nota kesepahaman ini dibuat dan ditanda-tangani oleh setiap pihak di Bandung pada tanggal Oktober 2009.

Pihak I

Pihak II

Pihak III

Eman

Deden Wahyudin

Komar

Pihak IV

Pihak V

Kwik Sri Kinarsih

Witono Adiyoga