



HORTIN II Co Innovation Programme

Towards cost effective, high quality value chains

Gross margin calculation models

HORTIN-II Research Report nr. 27

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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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1. Introduction

1.1. Research project

The three models are developed as part of the HORTIN Quantitative Economic Analysis (QEA). The Quantitative Economic Analysis project was supplementary to the three technical research projects within the HORTIN programme. The Quantitative Economic Analysis project used the data from each of the three technical projects to determine the economic impact of the changes made in the cultivation practices. This all in relation to the current cultivation practices for the three crops in Indonesia.

During the course of the project it became clear that there was a need for a gross margin model to support the technical researchers in their economic endeavour. The models are developed for gross margin and/or cost price calculations of the crops hot pepper, shallot and sweet pepper cultivation in Indonesia. With adaptations to the local situation the models could also be used in other countries and for other crops.

1.2. Method and materials

This report highlights per model two elements, the methodology and a user guide. Three models were developed. The first model to economically calculate the results of intercropping hot pepper and shallot in open field production. The second model is related to the sweet pepper cultivation in a greenhouse. The third model is to calculate the seedling cost of the nursery.

2. The models

2.1. General description

The gross margin is the difference between the output and the total of the specific costs. The remaining sum shows the margin to cover the non-specific (fixed) costs of machinery, land, building and covers the own labour of the farmer. There does not exist a standard methodology for gross margin calculations. This model is developed to make a gross margin and cost price calculation of the crops hot pepper and shallot in Indonesia. The outcome of the gross margin calculation is per bagian (Indonesian measure) which is 1600 square metres. For greenhouse and nursery the total area is taken as reference. For greenhouse the costs are calculated also per m².

2.2. General instruction

All models are made in the excel. The model field production contains six worksheets, the nursery model five worksheets and the nursery model two worksheets.

All models are designed in a similar way. A colour scheme is made to clearly indicate which cells to fill in and which cells not. On every model only the yellow and/or cells have to filled in. The yellow cells correspond to amounts or prices. The green cells contains the unit of the costs. Other colours are light blue cells for the formulas and orange for general or text related things.

The models are freely available with the researchers involved (in Indonesia and the Netherlands). Use of the model is at own risk and liability. The models are checked, but only limited. Therefore consultation with involved researchers in case of questions and remarks is highly appreciated.

The explanation in the following chapters per model highlights only the most important aspects. More detailed information on the models can be given by the researchers involved.

3. User guide: Field production (intercropping)

This chapter gives instruction how the field production model has to be used. The model is made in a specific order in which each component of the gross margin calculation is being calculated. The outcome of gross margin is presented per bagian. This means that if the costs are not per bagian these have to be converted to one bagian. The area unit can be changed without any problem. Important is to keep the unit for the area these in all units and prices used.

The order in which the worksheets are discussed are also the recommended sequence to fill in the model.

3.1. General information

The colour scheme in the model indicates the cells that hat to be filled in. All yellow cells can be filled in with amounts and prices. All green cells can also be filled in with the unit (for amount and price). All blue cells contain formulas and should not be adapted.

The worksheets "Propagation material", "Fertilization" and "Crop maintenance" are divided into two parts. The first part of the worksheet contains the materials used. The second part is the labour requirement related to the materials used. The materials and labour are both in the worksheet, but dealt with separately.

3.2. User manual field production

Worksheet "General"

This worksheet is for the general information like the name of the crop(s), the cultivation duration and wages for men and women per hour. This information will be used to calculate some of the costs on the other worksheets.

Worksheet "Propagation materials"

This worksheet is divided into two parts. The same two parts can be found for the worksheets "Fertilization" and "Crop maintenance". The first part of the worksheet contains the materials used. In the case of propagation material the seed, seedling, bulbs or other materials like seed treatments used. Second part is the labour required to prepare the field (ploughing or other soil preparation) and for seed cleaning, sowing or planting activities.

In the first section of the worksheet the input in units per bagian and the price per unit for seed or seedling/plants has to be filled in. **Only fill in the costs for seed if these materials are bought. If the farmer has saved a proportion of his yield for own seed material then these costs do not have to be filled in here, but on the worksheet gross margin. Which will be explained later in this document.** Also the costs for the chemicals used for seed treatment can be filled in and any other seed or plant material related costs.

In the second section all the hours of labour per bagian which are related to the seed and planting material and preparing the field has to be filled in. There is a differentiation between the hours made by men or women because of the different wages.

Worksheet "Fertilization"

In the first section of the worksheet all costs concerning fertilization has to be filled in. The worksheet shows the most common fertilizers. If the farmer has used a different kind of fertilizer(s) these can be supplemented on the worksheet. For every kind of fertilizer the input in units per bagian and the price per unit has to be filled in.

In the secondsection all the hours of labour per bagian which are related to the fertilization has to be filled in. There is a differentiation between the hours made by men or women because of the different wages.

Worksheet "Crop maintenance"

In the first worksheet al the costs concerning crop maintenance like pests control and weeding can be filled in. In the first section the costs for crop protection products can be filled in. These are divided in herbicides, fungicides and insecticides. The most common sorts are already filled in and can be supplemented with other kinds of crop protection . For every kind of crop protection product the input in units per bagian and the price per unit has to be filled in.

In the second section all the hours of labour concerning crop maintenance can be filled in. The most common labour activities are filled in. Hand weeding, pest picking and other labour activities that have no input in materials but are activities in the category of crop maintenance. There is a differentiation between the hours made by men or women because of the different wages.

Worksheet “Other costs”

This worksheet is added to facilitate additional materials or activities, like irrigation, land rent and screen nets. To facilitate durable goods like the screen net, a number of additional boxes is added next to the first section of the worksheet. In this boxes the life span, purchase price and remaining value can be filled in per separate item of (for example) the screen net (construction and net). Additionally the number of cropping seasons can be filled in. This to divide the costs over the cropping seasons per year. The durable goods are calculated into the first section (materials). There is a title durable goods. When all information is filled in correctly in the boxes. The information will appear automatically in the first section of the worksheet. Only the amount or number of construction of screen net needs to be filled in.

For the cost land rent only the price per day has to be filled in. The model copies the cultivation duration from the worksheet general and calculates the total cost for land rent. In the section labour costs all the hours of labour concerning the activities and materials in the first section can be filled in.

Worksheet “Gross margin”

The final step in the model is to fill in the yield per crop and the price. In case of using own seed the amount of production as seed (or bulbs/seedling/etc.). The amount of propagation material saved for own seed only has to be filled in if the farmer actually saves a proportion of his yield for own seed material for the next year. The model deducts the amount of seed which is saved for own seed from the income. The price is based on the price of the yield for the crop(s).

All costs in the “Gross margin” worksheet are copied into the worksheet from the other worksheets. Besides yield and selling price no other data needs to be filled into this worksheet. The worksheet is then complete. All filled in the Gross margin of the crops is stated at the bottom of the worksheet.

The result is a gross income per crop and total (intercropping). Also the costs and gross margin are mentioned per cost item for both crops and combined. This could provide a better understanding on net income, costs and gross margin per crop and combined.

4. User guide: Greenhouse production

This chapter gives instruction how the greenhouse model has to be used. The model is made in a specific order in which each component of the gross margin calculation is being calculated. The outcome of gross margin is presented per greenhouse. This means that if the costs are not per greenhouse or its area measure have to be converted to the specific greenhouse or its area measure.

4.1. General information

The colour scheme in the model indicates the cells that have to be filled in. All yellow cells can be filled in with amounts and prices. All green cells can also be filled in with the unit (for amount and price). All blue cells contain formulas and should not be adapted.

The worksheets "Nursery" and "Cultivation" are divided into two parts. The first part of the worksheet contains the materials used. The second part is the labour requirement related to the materials used. The materials and labour are both in the worksheet, but dealt with separately. The worksheet "Greenhouse" is divided into three parts. The greenhouse construction and plastic (no glass is used in Indonesia), the fixed-costs and the costs of the irrigation system.

4.2. User manual greenhouse production

Worksheet "Greenhouse"

The worksheet "Greenhouse" is divided into three parts. The greenhouse construction and plastic (no glass is used in Indonesia), the fixed-costs and the costs of the irrigation system.

All items that together make the greenhouse construction can be mentioned with the amount and price. Final items in the cost is miscellaneous. An additional 10% is calculated over the total costs of the construction. The second part of this table is the roof construction. In Indonesia plastic is commonly used.

Second table is the calculation of the total fixed costs. The greenhouse and roof construction costs are calculated into this table. If the company had multiple similar greenhouses there is an option to increase the number of greenhouses. Further information required is the amount of materials used in the cultivation. Materials like wires and shading nets.

Finally the table irrigation needs to be filled in. The amounts of bricks and drippers used per cropping system (6.7 stems/m² or 8.4 stems/m²).

Worksheet "Nursery"

This worksheet is divided into two parts. The same two parts can be found for the worksheets 'cultivation'. The first part of the worksheet contains the materials used. In the case of propagation material the seed, seedling, bulbs or other materials like seed treatments used. Second part is the labour required to prepare the field (ploughing or other soil preparation) and for seed cleaning, sowing or planting activities.

The first aspect is to fill in the germination rate of the seed (in %). The number of seedlings are copied from the number of plants needed in production. This is filled in on the worksheet 'cultivation'. Another aspect to fill in is the area (m²) that is used for the nursery. This information will also be used to determine the production area. Also the fixed costs are divided over the nursery and production by area measure (m²).

In the first section of the worksheet the inputs in units and the price per unit for nursery has to be filled in. The first part are durable goods (specific for the nursery). For example a table nursery and sowing tray are mentioned. Also the costs for the chemicals used for seed treatment can be filled in and any other seed or plant material related costs.

In the second section all the hours of labour for the nursery activities which are related to the seed and planting material and preparing the nursery has to be filled in. There is a differentiation between the hours made by men or women because of the different wages.

The total costs of the nursery are given by seedling (for production) and per m².

Worksheet “Cultivation“

In the first section of the worksheet all costs and also the yield concerning the cultivation/production has to be filled in. The first step is to fill in the number of plants in production. Next step is to fill in the yield of the crop (in this case sweet pepper). The yield is divided into three grades. Per grade the yield can be given. This could be changed to colour. The following step is to include all materials used in the cultivation of the crop, like seedlings, fertilization and crop protection.

In the second section all the hours of labour relevant to the cultivation of the crop has to be filled in. There is a differentiation between the hours made by men or women because of the different wages.

Worksheet “Price”

In this worksheet the price per grade and per period can be filled in. The model works with an average price per grade. The price information is used in the last worksheet ‘Financial results’.

Worksheet “Financial results”

Based on all information in previous worksheets the financial results are calculated in this worksheet. The gross margin and the net farm income are both calculated. Further some key figures are calculated, the yield per m², the costs per m², the costs per kg production and the costs per plant.

The financial results is given two tables. The second table had yellow field, an indication that these field can be filled in. The second table gives the opportunity to simulate yield and price effects in the same set. Due to plant failure or other mishaps during cultivation the yield can be lower. The yield effect has in that case no direct relation to the costs. The price is also not directly related to the costs. Therefore the option is made to simulate the effects of increase or decrease in yield and price.

5. User guide: Nursery

This chapter gives instruction how the model has to be used. The model is made in a specific order in which each component of the gross margin calculation is being calculated. The outcome of gross margin is presented per bagian. This means that if the costs are not per bagian these have to be converted to one bagian.

5.1. General description

The colour scheme in the model indicates the cells that hat to be filled in. All yellow cells can be filled in with amounts and prices. All green cells can also be filled in with the unit (for amount and price). All blue cells contain formulas and should not be adapted.

The model contains two identical worksheet "OP" and "Hybrid". The HORTIN-project was researching the differences between open pollinated and hybrid varieties. Because the worksheets are identical the one worksheet is explained.

5.2. User manual Nursery

Worksheet "Open Pollinated (OP)"

Similar as to the models Field and greenhouse production the worksheet is divided into two parts. The first part of the worksheet contains the materials used in the nursery. Second part is the labour requirement of the nursery.

Because the model calculates a nursery the germination, the plant loss and the number of planted seeds/seedlings. All costs are related to the total number of seed/seedlings planted. The result in seedlings that can be used in field production is based on the amount of plants/seed planted, the germination and plant loss.

In the first section of the worksheet the inputs and the price for the nursery has to be filled in. First step is to fill in the number of cropping seasons. The cropping seasons for the nursery is the times the nursery (specifically the durable goods) is used per year. In the case of hot pepper research (HORTIN) the nursery was only used twice a year. Therefore per cropping seasons. When also for other crops seedlings are grown in the nursery the number of cropping seasons should be increased.

A differentiation is made to durable goods and materials (other inputs). The price per durable good is calculated based on the additional boxes specific for durable goods. The amount of durable goods can be filled in. There is room for four durable items.

The following step is to include all materials used in the cultivation of the crop, like seed, fertilization and crop protection.

In the second section all the hours of labour related to the nursery has to be filled in. There is a differentiation between the hours made by men or women because of the different wages.

The result is the total costs for the nursery and per seedling produced.