Farm Business Planning Model in the Republic of Macedonia

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Farm Business Planning Model in the Republic of Macedonia

Деловно водење на фарма во Република Македонија

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Abstract

Farm record keeping in Republic of Macedonia is not recognized as one of the constructive and important management tools by the farmers. The focus of this study is to provide enterprise budget calculations for the most important vegetable crops in Republic of Macedonia, along with appropriate farm business planning model with regard to the Macedonian conditions. The study purpose is to improve the overall farm management by adapting the established farm business planning model.

The created enterprise budgets in the empirical approach are based on statistical data, panel analysis and field tests. With the aim of providing accurate and applicable enterprise budgets and farm business model related to the panel analysis, an Advisory Group was formed, consisting of four experts within the field. The field test was conducted to four types of farms (registered farmer, family farmer, experienced farmer and young farmer) aiming to test and examine the accomplished budget calculations along with the present situation. In general, record keeping gives information about the past activities and can present an information basis for farm business planning. Record keeping can improve the overall understanding of the farmers about the importance of the farm business plan. Based on the enterprise budget calculation and with some adjustments to the Macedonian conditions a farm business planning model was provided. The farm business planning model can be used as a tool for future planning, choosing the right combination of the production of enterprises as well as financial document for credit approval. The farm business planning can influence in the improving the overall management of the farm as well as in the further enhancement of the agricultural production.

Key terms: business planning, record keeping, enterprise crops, enterprise budgets, farm management

Апстракт

Водењето на евиденција на фармите во Република Македонија не се користи како една од конструктивните и важни менаџмент алатки на фармерот. Главниот интерес на оваа студија е подготовка на калкулации за најважните зеленчукови култури во Република Македонија, како и подготовка на соодветен модел за деловно планирање, земајќи ги предвид условите во Република Македонија. Целта на оваа студија е да се подобри менаџментот на фармата во целост преку приспособување на утврден модел за деловно планирање на фарма.

Креираните калкулации по линиите на производство во емпириските метод се базирани на статистички податоци, панел анализа и тестирање на терен. За изработка на правилни и апликативни калкулации (буџети) на производните линии, како и деловен модел на фарма согласност со панел анализата, беше формирана Советодавна Група која се состоеше од четири експерти од ова поле. Тестирањето на фарма беше извршено на четири типа на фарми со цел да се тестираат и испитаат извршените калкулации на буџетите со сегашната ситуација. Генерално, деловното водење на фарма дава информации за минатите активности и може да претставува база на информации за деловното планирање на фарма. Водење евиденција на фарма може да го подобри севкупното разбирање на фармерот за значењето на деловното планирање на фарма. Врз основа на калкулациите на производните линии и со соодветните приспособувања според условите во Република Македонија беше изработен моделот за деловно планирање на фарма. Моделот за деловно планирање на фарма може да се користи како алатка за идните планирања, а изборот на точната комбинација на линиите за производство исто така може да се искористи и како финасиски документ при добивањето на кредит. Деловното планирање на фарма може да влијае на подобрување на севкупниот менеџмент на фармата како и за понатамошниот развој на земјоделското производство.

Клучни термини: деловно планирање, деловно водење, линии на производство, буџети на линии на производство, менеџмент на фарма

Abbreviations

Denar - Macedonian currency
dc - decar
FAO - Food and Agricultural Organization of the United Nations
GM - gross margin
IFAD - International Found for Agricultural Development
IPARD - Operational Programme under the EU instrument for Pre-Accession for Rural Development
MAASP - Macedonian Agricultural Advisory Support Programme
MAFWE - Ministry of Agriculture, Forestry and Water Economy
MKD - Macedonian denar
NARDS - National Agricultural and Rural Development Programme
NEA - National Extension Agency
WTO - World Trade Organization

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Introduction

"Farm business management skills and knowledge is recognised as important for farmers to effectively respond to present day farming challenges. Farm management helps farmers to make the right choice between crop enterprises according to individual levels of financial, labour and land endowments and at their level of risk adversity." (www, FAO, 2007).

1.1 Problem background

Since 2002, after declaring independence from the Socialist Federal Republic of Yugoslavia in 1991 and subsequently the conflict of 2001 which had a seriously destabilizing effect on the economy of the country, the Republic of Macedonia is in a process of overall development, especially in the economic and agricultural sector (www, World Bank, 2008).

The agricultural sector is facing difficulties with its competitiveness as a result of low or insignificant investments in production technology, difficulties in providing loans, and small size farms (www, MAFWE, 2008). Still, this sector is of great importance for the Macedonian economic and social stability. One of the reasons for this is that it contributes to 12 percent of GDP and if agri-food is incorporated with 16 percent (www, MAFWE, 2008). Furthermore, not only that the agricultural sector contributes to the economy as a major employer, also it is of great importance for the rural development since more than half of the population lives in the rural areas (www, World Bank, 2008). Approximately, 87% of total area of the Republic of Macedonia is covered with villages (NARDS, 2007). The Republic of Macedonia is generally characterized with fertile soil and natural pastures as well as advantageous continental - mediterranean climate, which are favorable for agricultural production. In relation to above-mentioned, almost half or 49 percent of the total area is agricultural land consisting of arable land and pastures (www, MAFWE, 2008). However, the total utilized agricultural area is under constant decline. In 2000 the total cultivable land was 598.000 ha whereas in 2005 it was 546.000 ha and in 2006 it was 537.000 ha (State Statistical Yearbook, 2007). Moreover, from the total cultivable land, approximately 20% or 196.841 ha are owned by the Government or rented to 136 agricultural companies, whereas the rest of the 80% or 463.000 ha are owned or rented by the (family) individual farmers (NARDS, 2007). [1]

Vegetable production is one of the most significant traditional sub-sectors as well as among the most successful ones within the Macedonian agriculture. On approximately 60.000 ha, more than 750.000 tones of vegetables are produced. At present, the vegetable crops that are of greatest importance are tomatoes, peppers, cabbage, melons and watermelons, cucumbers

[1] Agricultural company is an organizational unit registered by the Ministry of Agriculture, Forestry and Water Economy with agricultural production as a main activity. An agriculture company can have one or more farm enterprises (www, MAFWE, 2008).
An individual (private, family) farmer is every person who has small volume of agricultural production and is registered in the Register of individual farmers (www, MAFWE, 2008).
Until the 1994 census, the term "individual farmer" was used. Today, the Law on Agriculture and Rural Development defines the family agricultural household. A "family agricultural household" is an independent economic and social unit based on ownership and/or use of the agricultural land managed by the members of the family household (www, MAFWE, 2008). A member of a family agricultural household is any person whose main activity is agriculture on agricultural land registered with the Ministry of Agriculture, Forestry and Water Economy (www, MAFWE, 2008).

and potatoes. In addition to these crops, within this sub sector, beans, onions, garlic, leeks etc. are also produced (www, investinmacedonia, 2008).

Even though the agricultural sector plays an important role in the Macedonian economy, - data collection and record keeping, which are essential parts of farm management, are not yet everyday practices of the farmers. Main reasons for this can be lack of knowledge, and lack of information and education of Macedonian farmers (Dimitrievski et al, 2006). Nowadays, record keeping and data collection in overall agricultural production as well in agriculture sector and farm management in the Republic of Macedonia and its sub-sectors is in a process of implementation and development. Since the recorded data is crucial for future planning, maximising profit and further expansion of the farm, many different workshops, seminars and training programmes are organised in order to better inform and educate the agricultural producers.

1.2 Problem

After gaining its independence from the Former Yugoslavia in 1991, the Republic of Macedonia is in a process of economic development, especially in the agricultural sector. The agricultural sector went through many changes in the process of transition and is facing many difficulties to adjust to the new production and to the newly set market conditions.

In recent years, the Macedonian agriculture is trying to move closer to the European standards of agricultural production, for which one of the steps is to include recording of farm data. This should support the reliable farm management practise. The farmer as a manager fulfils the basic management functions, such as planning, organising, coordinating and controlling. Furthermore, the decision making process is facilitated when using all available resources on the farm in order to fulfil the farmer's objectives and make the farm business further expand.

As a result of the rapid and constant everyday changes in the Macedonian agriculture, many farmers face difficulties and problems adjusting to these transformations. Consequently, the Macedonian farmers are struggling when recording farm data. One of the main reasons for this might be the lack of information and knowledge (Dimitrievski et al, 2006). However, despite the fact that the farmers are not informed enough, they have to make everyday decisions and plan their activities in order to successfully manage the farm businesses. Moreover, keeping records continuously will not only help the farmers to make more relevant decisions, but also it is one of the most important steps in good farm management. The recorded data must be simple and easily understandable not only for the farmers, but also for the other relevant users (J. Turner & M. Taylor, 1998).

Since the farmers need to make future plans on the farm, having records can describe what has happened and it could be a useful tool for making decisions. Moreover, farm record keeping can be used as information basis when new activities are taken into account, such as new investments or changes in the organization. In addition, farm record keeping from the previous years can be used as a starting point when planning the production output as well as for estimating the expected profit or loss.

That is why a well-organized and concisely defined farm business plan model (program) is a necessity in the Republic of Macedonia. Through this model, managers of the farms can

easily organize the collected information, analyse the existing production, put the collected information in a context as well as identify critical and missing information.

1.3 Aim

The aim of this study is to show how collecting farm data and calculating the enterprise budgets can assist in improving the overall farm business management and along with that, farmers' decisions. Furthermore, the aim is to understand in what manner implementing enterprise budget calculation can help farmers in terms of having an enhanced evaluation of the economic effects that farm business planning has in general.

The main objectives of this study are as follows:

- Define the production normative on best practice Macedonian farms for the most important vegetables.
- Adapt a farm business planning model in order to facilitate the farmer's decision making process.
- Test a farm business planning model in order to facilitate the farmer's decision making process

1.4 Outline

Figure 1 illustrates the outline of the thesis, which is intended to give the reader a picture of the structure of this study. Chapter 1 will give the reader a short introduction about the problem background and problem area as well as the methodical approach. The theory and the empirical background are the bases for the discussion and analysis. Subsequent to the study work are the conclusions.

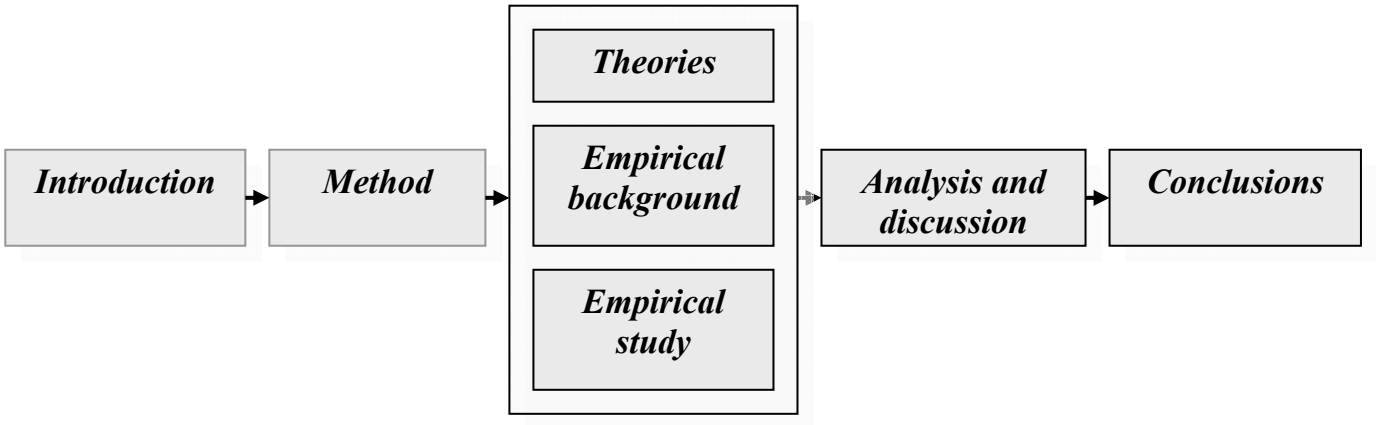

Figure 1 Illustration of the outline of the study

2 Method

Presented below is the method approach that would be undertaken in order to fulfil the aim with this study. The method used is only broadly motivated in this part, the theories behind are motivated further in Chapter 3.

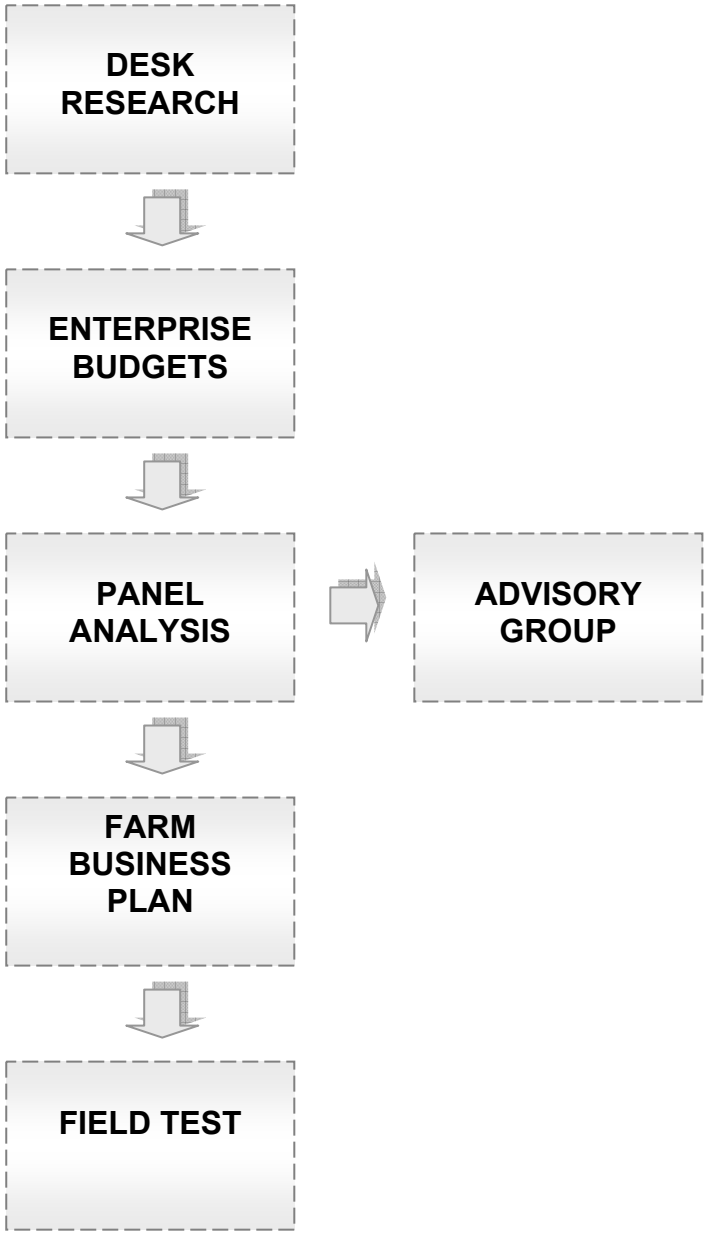

Figure 2 Illustration of the parts of method approaches

2.1. Data collection

The process of data collection embraces desk research, collecting relevant data along with panel analysis and field research.

2.1.1 Desk research

In order to get a broad understanding of the terms and the steps influencing farmer's decisions, we made a desk research concerning farm management which included decision making and farm accounting. Moreover, in order to achieve background knowledge of the study area the desk research was focused on identifying the available resources and their proper allocation and organization for maximising the profit and calculating the enterprise budgets on the farm.

With the intention of obtaining more relevant data the statistical data was gathered from Macedonian statistical annual reports. The data collected is related to the average purchase prices for the vegetable crops that are part of this study research along with the average obtained yield per hectare. In addition, in order to get the accurate prices and normative for the other inputs in the production of the enterprise crops, relevant data was also collected from other sources, such as farm surveys, previous researches etc.

2.1.2. Enterprise budgets

The enterprise budgets for the most important crops were composed on best practise, engineer approach basis. The calculation of the budgets was based on the gross margin calculation method based on variable costs along with budgeting common costs, investments and financing, and forecasting profit and loss statement (B. Öhlmer & T. Karlsson, 2008) (see Chapter 3). Concerning the calculation of the enterprise budgets of the selected crops, data about the quantity and the prices of the inputs used will be gathered, because such detailed data are not available otherwise (see Chapter 5).

2.1.3 Panel analysis

Regarding the panel analysis, an advisory group was formed, consisting of four experts familiar with the area of research. The main focus of the advisory group was to test the enterprise budgets and confirm the relevance of the calculations performed. The members of the advisory group were from the following institutions:

- Faculty of Agricultural Sciences and Food – Skopje
- International Fund for Agricultural Development (IFAD)
- National Extension Agency
- Farmers Union

2.2. Field test

The field test was needed to test the empirical applicability of the results. Furthermore, the field test was undertaken after calculating the enterprise budgets in the farm business planning model, where Macedonian farmers whose main production includes vegetables were interviewed in order to examine the present situation and the applicability of the enterprise

calculations. The field test included farmers with different characteristics regarding the farm profile. Each farmer is a representative of the each group and the results obtain from the test were approved by the Advisory Group. In addition to this, the field test was respectively applied on[2]:

- One agriculture company (registered farmer)
- One individual (private) family farmer
- One farmer with previous experience in agriculture (experienced farmer)
- One farmer without experience (young farmer)

2.2.1 Farm business plan

The Farm Business Plan, developed by SLU, was chosen as a model to this study since it was available and suitable and furthermore it was adjusted to Macedonian conditions and used for analysis of the case studies from the field test.

The data for the business model was collected from the field case studies and from the provided enterprise budget calculations based on the panel analysis. Moreover, for the purpose of establishing an acurate farm business model data was gathered concerning the figures of the summary part such as total working capital, total labour requirements, income before depreciation, depreciation and income from capital and earned income (see Appendix 13-16), and the profit and loss statement figures (see Figure 3).

Furthermore, in order to accomplish a well-defined business plan, the functional method for calculating the depreciaion was used. The functional method can be defined as degree of the functionality of the fixed assets which doesn't take into account the time of usage of the fixed assets.

[2] All farmers, except the registered farmer, are family (individual) farmers

Profit and loss statement

Income	**Value**	**%**
Crop 1 Crop 2 Subsidies and other income		
Total income		100%
Costs		
Cost 1 Cost 2 Cost 3		
Total costs		100%
Income before depreciation		100%
Depreciation (yearly reinvestment and amortisation requirements)		
Depreciations, intangible assets Depreciations, production rights Depreciations, buildings Depreciations, machinery/inventory Depreciations, building fittings Depreciations, land improvements		
Total depreciation (yearly reinvestment and amortisation requirements)		100%
Income after depreciation		100%
Financial income and costs		
Interest earned, liquid assets Interest paid, long term debts		
Total financial incomes and costs		100%
Income from capital and earned income		100%

Figure 3 Profit and loss statement

3 A theoretical perspective

Farm management as a new concept indicates vital business planning and calculation of enterprise budgets regarding gross margin analysis. The literature study listed below presents the theoretical background concerning farm management and business planning model along with enterprise budgets calculation. The technique and the process of developing and analyzing the models in the literature study will be the bases for establishing and explaining the results.

3.1 Development and necessity of farm management

Even though the farm presents a basic unit in agriculture established since many centuries ago, primarily for production and management of food, farm management is a fairly new principle of managing the farm (Yang, 1965). Until 1910 there were no- significant developments and researches undertaken in this area (Efferson, 1953). Throughout - many years, farm management has been developing as a result of the gathered experience and amassed the proficiency from the previous generations (Efferson, 1953).

Efferson (1953, 5) defined farm management from the viewpoint of profit and efficiency, including the organization and operation on the farm, assuming that it is farmer's interest to lead the productivity in order to maximize the profit. In addition, he introduced that the key of good and successful managing of the farm is not only of having basic farm management knowledge, but also in having knowledge of two more important factors*: "1) familiarity with the farm practices and operations in the area, and 2) knowledge of the scientific principles of the crop and livestock production involved in the farming program."*

According to Yang (1965, 2), farm management includes accurate combination of factors of production, such as land, labour and capital and the alternative choice of available resources in order to obtain a maximisation of the profit.

Olson (2003, 6), described farm management as complicated science with many uncertainties, demands and changing conditions. Similarly to Yang, Olson (2003, 1-2) defined farm management as a process of allocating the resources, which are limited, in order to obtain efficiency of the farm. Accordingly, he emphasised the importance of farm management, since in correlation with the farm type, the farm manager besides the basic knowledge of agriculture production and economics must have knowledge of various areas, such as areas concerning soil structure, crop and animal nutrition, plant and animal diseases, mechanical equipment, economics, financial management, food markets, human psychology, business organization, business law, communication and strategic and operational management, moreover the farm manager must have familiarity and information on the future price trends, the development of new technology, etc. (Efferson, 1953, 6).

The most appropriate way of allocating the resources and along with that providing a better combination of the production factors is setting objectives. The management of the farm is successful if it is managing and setting the activities in order to fulfil previously defined and planned objectives (Turner & Taylor, 1998). A farm can have different and various objectives (Turner & Taylor, 1998, 1), since agriculture is both production and consumption process

(Olson, 2003, 4). Turner and Taylor (1998, 1-2), provided examples of many objectives of the farm manager, which can be established in economic, political, legal and social environments, such as maintaining the current farm business, expanding the farm business or accumulating a considerable capital, furthermore other objectives of the farm manager might be reducing the costs, having more free time, making more profit etc (Olson, 2003, 3). Turner and Taylor (1998, 1-2) expressed the view that farm management is successful if it focuses its activities so as to fulfil the formerly specified objectives. Objectives can be achieved only if plans are defined, implemented and evaluated, and in certain situations, if needed, plans might be re-evaluated in order to be sure that the objectives would be achieved.

3.2 Farm management functions

Most of the broad definitions of farm management pay attention to the management functions as well. Many authors have different opinions concerning the question as to which functions constitute management, but almost everyone have planning, organizing and controlling as management functions.

According to Olson (2003, 7), the basic management functions are as follows: planning, organizing, directing and controlling. We will focus on the planning function since the model will be developed in a correlation with this function.

Turner and Taylor (1998) described management functions as presented in Figure 4 below:

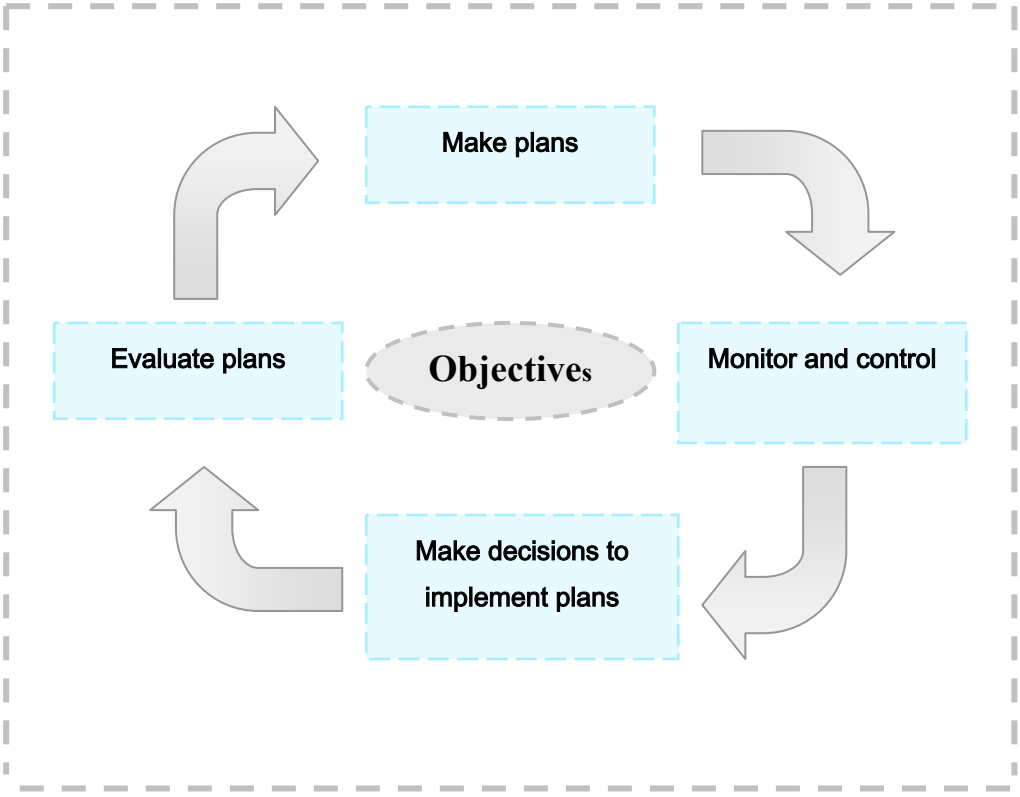

Figure 4 Management functions

3.2.1 Farm business planning

As stated above, planning as one of the functions of management presents a process of arranging the actions and the plans with the purpose of fulfilling the objectives of the farmers. The planning process is important at all levels of management, but it varies depending on the management level (Shuklev, 2004).

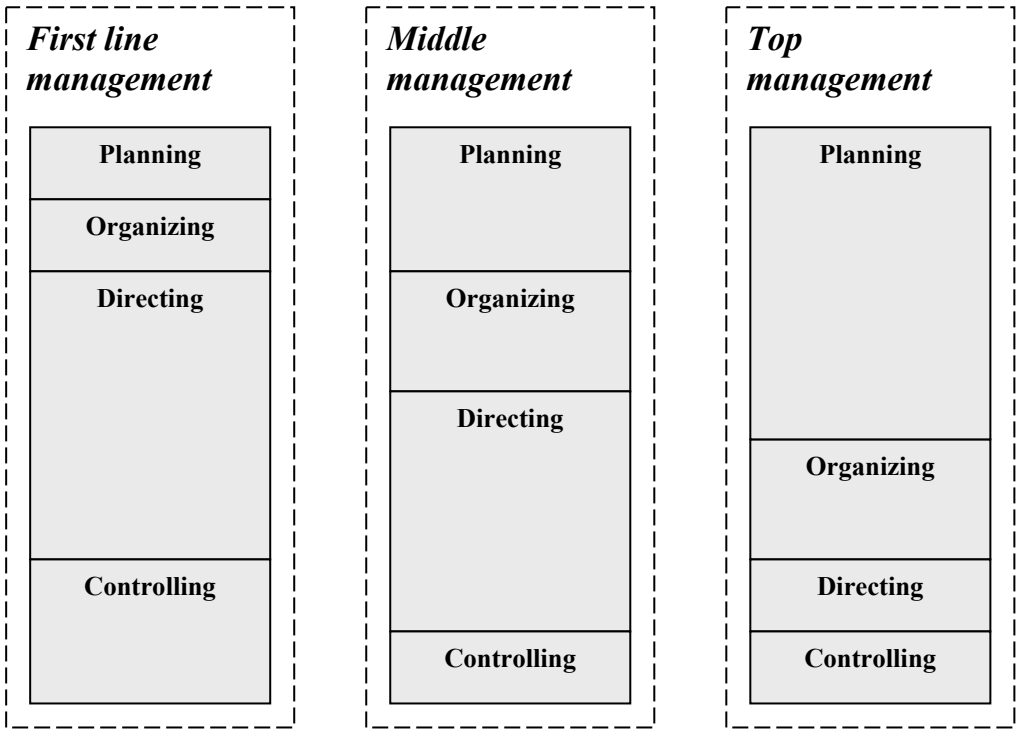

Figure 5 Management functions and levels

Figure 5 shows the importance of the planning function as we go up the management ladder, i.e. planning is of essential importance for the top management.

Yang (1965, 120) provided that even though most of the farmers do not make notes about their plans, they still plan their actions and the needed activities on the farm. Additionally, he identified that in order for the plan to be successful, different actions should be planned, organized and successfully accomplished. The planning process itself can consist of planning these actions - such as how much input to use, which combination of inputs to use and which output to produce (Öhlmer, Göransson & Lunneryd, 2000). In addition to this, applying a plan requires different decisions to be made, such as which fertilizer to use, which crops to produce, should the farmer invest in making a new plan etc. Olson (2003, 9), concerning planning as a management function, specifies that the farm plan should also take into consideration the general policies followed by certain strategies that should be achieved. Regarding this aspect, he divides plans subject to the time, the problem and the part to which it is considered.

Yang (1965, 121-123), explained the meaning and the importance of planning as an essential part of managing the farm. In addition, a well-defined plan leads to enhancement of the overall organization and activities on the farm, an improved method for analyzing the impact on the final results owing to the new applied technique or to the new combination of

enterprises. Moreover, for effective achievement of the plans, they have to be compared with the achieved results on the farm (Yang, 1965), and if it is needed, certain adjustments and changes in order to accomplish the desired goals on the farm should be made (Olson, 2003).

When preparing a farm business plan and deciding which enterprises to include, there is no specified rule for farm managers (Training Manual, FAO). In order for farm managers to provide a well-formulated business plan, they have to plan their activities so as to have overall control of the expenses, achieve sustainable incomes etc. (Olson, 2003). Furthermore, farm managers have to make decisions regarding which enterprise to conduct and in what combination (Training Manual, FAO). According to the Training Manual, the farm business process includes the steps explained below:

- ***Formulating goals and objectives -*** This step refers to defining and setting the goals with regard to the farm. The goals are selected depending on the farmer's priorities and aims. These goals might include maximization of the profit, reducing the costs etc.
- ***Preparing a farm resource inventory -*** Since the farm resource inventory is a base for identifying the problems as well as the constraints of the farm, it is of great importance to evaluate and arrange the resource inventory, such as land, labour, machinery, buildings. In order to have a complete resource inventory past data on the resources is needed.
- ***Identifying opportunities -*** In this step market opportunity are evaluated and taken into consideration, regarding the expected prices, the demand for the product, and the costs for transport and storage.
- ***Preparing enterprise budgets and selecting the most profitable one -*** The third step is concerned with the financial conditions of the farm and along with that the planning and preparing of the budgets of the enterprises. It can be evaluated by calculating the costs and incomes of each enterprise. Which enterprise would be included in the farm plan depends on the farmer's experience and aims. In practise, farmers usually don't change their farm plans; if the situation requires they make certain adjustments and modifications of the farm plan, for example if the market conditions are changed they might include a new enterprise.
- ***Preparing a whole farm budget and action plan -*** The calculation of the gross margin for every enterprise presents a base for preparing the whole farm budget and action plan. From the results provided, the farmer can make a combination of the available resources on the farm and decide between the most feasible enterprises. The selection of the enterprise combination is based on the market opportunities, available resources, use of other resources, as well as farmer preferences. The action plan is concerned with the physical and financial characteristics of the plan, which consist of planned crop rotations, a calendar of operations, farm investments, labour requirements, and enterprise budgets.

Farm managers have many tasks, such as monitoring and control of all the activities on the farm on an everyday basis. This provides the need and the importance of preparing a farm business plan, which can be for a short period of time (week, month, year) or for a longer period (five to ten years). Not only is the farm plan useful for control and monitoring, but it can also be a useful document for creditors, investors as well as customers (Olson, 2003).

Olson (2003, 16) described the importance of having a written business plan. Compiling a farm business plan will have an influence on reconsidering the decisions, the communication with the others as well as improving the memory and thinking.

3.2.2 Farm business planning model

The farm business model was developed by SLU (Swedish University of Agricultural Sciences) in cooperation with LRF Konsult (The Farmer Union Advisory Company) and Swed Bank (Savings Bank). The purpose of this model is to provide suitable information when preparing farm business plan. The model itself should present a base when evaluating and estimating the financial position of the farm along with the incomes and the costs, as well as the profit of the farm. Furthermore, the planning model can be used as a planning document when applying for a credit. The business model is suitable and applicable for many users. For example, it can be applied and used by recently established farms, by farmers who are interested in investing in new enterprises, and when a certain farm wants to accomplish a financial analysis. Furthermore, this programme is appropriate for company owners, advisors and university professors as well (Driftplanerings program, 2006).

The data needed for the planning model is collected from the farm for which the plan is intended along with the problematic situation. If the planning model refers to determining a new enterprise or a new technology, then a trial and error method is used (Driftplanerings program, 2006).

Olson (2003, 18), describes which parts the business planning model should consist of. Below in the text the parts of the business plan according to Olson are described (2003).

The first part of the business planning model is the *executive summary*. This part describes the strategic plan of the farm and its implementation, and all the required resources. The next part is general description, where all the data for the farm is presented through its history, type of business, economic position, market and location description. In the *strategic plan* part, the goals and the objectives of the farm are presented along with an explanation of the chosen strategy and the way of its implementation. The *marketing plan* includes the plan for pricing the products, furthermore it should include plans if some changes on the market occur. Moreover, the marketing plan should involve a plan for purchasing the required inputs of the production. In the production and operations plan, the purpose for selecting different enterprises is motivated. Also in this part the quantity and the timing of all inputs is defined. The *financial plan* part describes the historical financial position of the farm by providing different analysis such as ratio analysis, balance sheets, income statements and cash flow statements analysis. Additionally in this parts, different suggestions should be listed regarding the capital requirements, decreasing of the financial risk and protecting overall financial business. The last part is the plan for organizing and staffing the farm business. This part includes an estimate if any supplementary labour or hiring consultants and advisors is of crucial need.

3.2.3 Production function

The production functions are similar in different farms and the enterprise budget data are based on the production functions. In addition, the production function can be defined as the relationship between the used variable inputs and the output.

$$Y = f(X_1 | X_2, ..., X_n)$$

"The formula above indicates that the amount of Y is a function of one variable input X_1 and the level of fixed inputs X_2 through X_n" (Öhlmer, Göransson & Lunneryd, 2000).

In order to determine the level of variable X_1 for the profit maximizing, we maximize the profit function.

$$\Pi = P_y \times Y - P_{x_1} \times X_1 - FC$$

Whereas,

Π - profit
P_y - price of output Y
P_{x_1} - price of input X_1
FC - fixed costs

Assuming that P_{x_1} and P_y are constant, in order to obtain maximization of the profit we differentiate with respect to X_1

$$\frac{\partial \Pi}{\partial X_1} = \frac{\partial Y}{\partial X_1} \times P_y - P_{x_1} \geq 0$$

From the formula above follows

$$VMP = \frac{\partial Y}{\partial X_1} \times P_y$$

$$MFC = P_{x_1}$$

Whereas,

VMP - value of the marginal product
MFC - marginal factor cost

The value of the marginal product (VMP) is defined as the increased value of output as a result of additional unit of X, taking into consideration that y is constant market price (Debertin, 1986). "Whereas the marginal factor cost (MFC) is defined as increase in input costs resulting in the purchase of additional unit of input" (Debertin, 1986).

From the above explained it follows that *the profit is maximized when the value of the marginal product (VMP) is greater or equal to the marginal factor cost* or:

$$VMP \geq MFC$$

The possible combinations of two variable inputs, which can be used to produce the same output level is identified as isoquant.

$$X_1 = g(X_2 | Y^0, X_3, ..., X_n)$$

Whereas X_1 and X_2 are the variable inputs, Y^0 is the output level and X_3 through X_n are the fixed amounts of other factors.

"Furthermore, the marginal rate of substitution (MRS) is used to measure the amount of one input that substitutes another. The marginal rate of substitution (MRS) can be defined as the amount of one input decreases, the amount of the second input increased by one unit" (Öhlmer, Göransson & Lunneryd, 2000):

$$MRS = \frac{\Delta X_1}{\Delta X_2}$$

The combinations of X_1 and X_2 which can be purchased for a fixed amount of money (K) are expressed by the isocost line.

$$K = P_{x_1} \times X_1 + P_{x_2} \times X_2$$

Where,

P_{x_1} - price of X_1

P_{x_2} - price of X_2

The formula of the isocost line can be rewritten as:

$$X_1 = \frac{K}{P_{x_1}} - \frac{P_{x_2}}{P_{x_3}} \times X_2$$

The slope isocost line is:

$$-\frac{P_{x_2}}{P_{x_1}}$$

"The least cost point is the isocost line that is tangent to the isoquant" (Öhlmer, Göransson & Lunneryd, 2000):

$$-\frac{P_{x_2}}{P_{x_1}} = -\frac{\Delta X_1}{\Delta X_2}$$

Or:

$$P_{x_2} \times \Delta X_2 = P_{x_1} \times \Delta X_1$$

"The formula above indicates that the marginal cost of one input is equal to the marginal cost of the other input" (Öhlmer, Göransson & Lunneryd, 2000).

Besides the fact that the profit function can be maximized with respect to changes in X_1, additionally if we assume that the prices are constant the maximization of the profit can be also obtained with respect to changes in Y (Öhlmer, Göransson & Lunneryd, 2000).

$$\frac{\partial \Pi}{\partial y} = P_y - P_{x_1} \times \frac{\partial x_1}{\partial y}$$

In order to maximize the profit, P_y should be equal or greater than the marginal cost.

$$P_y \geq P_{x_1} \times \frac{\partial x_1}{\partial y}$$

The calculations provided above regarding the profit maximization could be used in the "trial and error" method explicated in the previous section.

3.2.4. Enterprise budgets

In farm management, enterprise budgets give an overall picture about the costs, expenses along with incomes and revenues per unit for a given time period (Ahearn & Vasavada, 1992).[3]

Enterprise budgets are calculated in order to determine the profitability on the farm (www, okstate, 2008); enterprise budgets can also be calculated for a certain enterprise or for the whole farm (Olson, 2003). Furthermore, from enterprise budgets, the farm manager can recognize the necessity for the farm to take credits from banks (www, agalternatives, 2008). Although the basic purpose of enterprise budgets is to evaluate the profits and the costs of the farm as well as to estimate the possible risk, the enterprise budgets can also be used when making analysis in the agricultural sector for the need of the government, agriculture producers, and financial decisions (www, agalternatives, 2008).

Additionally, Doye (www, okstate, 2008) describes that enterprise budgets give overall information concerning the expected results when producing previously defined quantity of enterprise crop. Moreover, Doye (www, okstate, 2008) identified the lack of information as a main problem when defining enterprise budgets. Very often farm managers are faced with lack of information regarding production conditions, since they can not make future predictions about weather conditions, market requirements for different products as well as the price of the outputs. Good information is an important part when defining enterprise budgets, since farm managers make decisions in view of this information. Not enough information can lead to problems in managing the farm and achieving the goals of the farm (Olson, 2003).

According to Doye (www, okstate, 2008), quality information can be obtained from several different sources: "farm records; area summary analysis; country production data; typical budgets; farm literature; information from meetings and neighbours". Consequently, farm managers are faced with problems when determining the costs of the production. Some costs can occur to more than one enterprise. These costs are defined as overhead costs. Examples of

[3] "In farm management, budget is defined as estimating how much is available. An enterprise is a common name for any alternative such as corn or dairy (Olson, 2003)."

these costs are record keeping, budgeting, buildings, machinery etc. (www, okstate, 2008). Furthermore, fixed and variable costs can be part of the overhead costs (www, okstate, 2008). Direct costs are those which are directly included in the production of a product or enterprise (Milanov & M. Stojceska, 2002). These costs include the wages of the employees and the costs of inputs used in the production process (Milanov & M. Stojceska, 2002).

When selecting enterprise budgets, farm managers should pay attention to the financial condition of the farm along with other conditions such as land and weather (Ahearn & Vasavada, 1992). In addition to this, farm managers can base their selection of enterprise budgets in correlation with the expected returns and variable costs (Ahearn & Vasavada, 1992).

The enterprise budgets calculations in the farm business planning model are based on gross margin calculation method (Öhlmer & Karlsson, 2008). This method is based on variable and fixed costs and is not taking into account the overhead costs mentioned above (Turner & Taylor, 1998).

Total costs of the production are the sum of the variable and fixed costs (www, okstate, 2008). Variable costs are the costs that are changing with the change in the production level (Milanov & M. Stojceska, 2002). Variable costs are costs that are occurring in one production period (www, okstate, 2008); these costs are short-term costs appearing in a period of less than one year (Gjosevski et al, 2007). These costs occur only if production process exists (Gjosevski et al, 2007). Example of variable costs are seeds, fertilizers, labour, fuel (www, okstate, 2008).

Contrary to the variable costs, fixed costs are not changing with the production level and they can refer to a period longer than one year (Gjosevski et al, 2007). Examples of fixed costs are taxes, insurance, maintenance, rents, and interest payments (www, okstate, 2008). In order to estimate the profitability of an enterprise, it is of crucial importance to take into consideration the fixed costs. Fixed costs present a sum of depreciation, interest, taxes and insurance costs (www, okstate, 2008).

The generally accepted formula of gross margin is presented below (Öhlmer, Göransson & Lunneryd, 2000):

Gross margin = incomes - separate costs

Dimitrievski, (2007, 15) presented the formula for the gross margin as:

Gross margin = total outcome - total variable costs

From the formula by Öhlmer, Göransson & Lunneryd (2000, 218) it can be seen that only incomes and separate costs are taken into account when calculating the gross margin. Separate costs are the costs for transport, losses, drying, costs for fuel, oil, maintenance per day etc. and they mainly refer to the variable costs. Furthermore, Öhlmer, Göransson & Lunneryd, (2000, 219) specified several methods of calculating the gross margins when calculating the gross margin:

- TB1 = separate incomes - separate costs
- TB2 = TB1 - separate product group costs

- TB3 = TB2 - separate enterprise costs

The first level of gross margin (TB1) is calculated as the difference between the total income (includes the obtained yield and price along with other additional incomes, such as for instance different support measures and subsidies) and the separate (variable and direct) costs. The second level of the gross margin (TB2) further deducts the costs for maintenance and interest working capital. The third level (TB3) calculates the enterprise costs which include the costs for depreciation of the machinery and required labour on the farm.

When calculating the gross margin it is important to note the date and the size of the production, while the date of the price of the product is noted when the product is finished (Öhlmer, Göransson & Lunneryd, 2000). Additionally, labour and manager's work should be assigned to working capital costs.

Turner & Taylor (1998, 47) identified the advantages and disadvantages of the gross margin method.

Advantages of the gross margin method

- Simple method
- The needed data and information are easily accessible
- Gross margin method can be used as a basic tool for planning on the farm
- Gross margin can give a picture of the efficiency of the farm

Disadvantages of the gross margin method

- Doesn't provide an overall picture of the farm return (profit/loss)
- Doesn't consider the overhead costs
- It's disproportional with the profit
- It's not the same every year

In order to get an overall picture, the overhead costs (including the fixed costs) had to be deducted from the sum of the enterprise gross margins.

4 Background for the empirical study

This chapter deals with the historical overview of the traditional vegetable crops, the method of their growing and production. Also this chapter includes a brief overview of farm record keeping practices in the Republic of Macedonia until nowadays. Furthermore, this chapter includes a transparent view of the vegetable crops production in different regions countrywide.

4.1 Vegetable production

The significance of the vegetables, especially of fresh vegetables, consists mainly of their contribution to the human diet and vitamin intake. The importance of vegetables has been established for quite some time and has been proved by many studies. One of the foremost reasons why people are using different varieties of vegetables in their everyday lives is their nutritional importance and the diversity they provide in the human diet (Martinovski, Petrevska & Popsimonova, 2002). The consumption of vegetables has a great implication on the human health with its attributes of high vitamin and mineral contents, high dietary fiber, low saturated fats, low cholesterol level, low caloric density etc.

All the above-mentioned emphasizes the need for maintaining the quality and quantity of the products, increasing the safety measures when handling them as well as organizing teams of experts that would be responsible for implementing certain rules and standards in different conditions (Martinovski, Petrevska & Popsimonova, 2002).

4.1.1 Structure of vegetable production

Looking back from a historical perspective, vegetable crops, especially pepper, tomato, cabbage, cucumber and watermelon were brought into the region that would become the Republic of Macedonia in the 16th century with the expansion of the tradition that had existed in the Ottoman Empire. Being under the influence of the Ottoman Empire resulted in accepting and adjusting to a new tradition and new ways of growing these vegetable crops. Macedonia had the chance to be the first region on the Balkan Peninsula that experienced the introduction of these new types of crops. Furthermore, Macedonia as a core of the Balkan region was a starting point for further expanding of the new crops by the Ottomans in the rest of the Balkan countries (Jankulovski, 1997).

However, the intensive production of these crops in the country has a recent history. The intensive vegetable production began in the 70’s of the 20th century and has been expanding all over the country as a result of the enhanced conditions improved with the modernization of the production process. Although they were brought as exotic crops, Macedonian people recognized their quality and their benefits in food supply so after few centuries they have become widespread and today they have a status of traditional crops in the Macedonian region.

At present, the production of these traditional crops has become one of the most developed subsectors in the agriculture sector. Moreover, the quality as well as the quantity of the production of these crops is constantly increasing and it results in opportunities for exporting

them not only in the neighbouring countries, but also in the EU countries. For this purpose, certain standards have to be fulfilled regarding the conditions of the production process. With the confirmation of the quality of the traditional crops and the communication worldwide, at present many agricultural producers are interested in producing alternative and non-traditional crops such as asparagus, broccoli, Brussels sprout, Chinese cabbage etc (NARDS, 2007). Vegetable crops are mostly introduced in large quantities on wholesale markets and green markets located in the urban areas of the cities. The main problem concerning the agricultural producers who decided to sell their products on the wholesale markets is the inappropriate way of storing the products, along with unsuitable packaging. Moreover, the lack of practices of sorting and grading them into different classes further aggravates the problem (MAFWE, Annual Agricultural Report, 2006).

4.2 Farm record keeping

In Macedonia, farm record keeping is still not recognized as a valuable tool of farm management by the farmers. Even though farm record keeping can enhance the overall management of the farm, Macedonian farmers are not obliged to keep farm records yet (M. Stojceska et al, in preparation)[4]. On the other hand, the number of farmers that are keeping farm records is insignificant because the general impression of Macedonian farmers regarding farm record keeping is that it is a problematic and difficult time-consuming activity (Dimitrievski, et al, 2007). Even though it appears that the farmers have to put a lot of effort in this, the advantages of farm record keeping outweigh the disadvantages. Keeping farm records is important in terms of:

- Providing information about the farm performance (obtained profit/loss)
- Having an exact picture of every farm enterprise
- Improving the planning and the organization of the farm one year in advance
- Better performance when an application for a loan is submitted

Nowadays, efforts are being made for familiarizing the agricultural producers with the meaning and the importance as well as the need for farm record keeping. For that purpose many workshops and trainings were organized (IFAD, NEA, MAFWE etc). These types of training include explanation of the basic terms and definitions to the farmers, as well as the meaning of farm record keeping and the reasons for its implementation. Furthermore, farmers are given the opportunity to exercise simple farm record keeping.

In order to train and prepare the farmers to introduce farm record keeping, the extension service and agricultural advisory segment play an important role. For instance, the National Extension Agency in Bitola (NEA) has introduced a Farm Monitoring Survey (FMS) in 2001, in which around 500 farms are included every year. The advisors help the farmers to keep records of all their income and costs, as well as registration of the farm assets.

An important development is that the eligible candidates (farms) that will have access to the EU supported funds from 2009 will have to maintain farm accounting within at least 5 years after approval of the grants.

[4] There is no legal obligation to have farm accounting on family (individual) farms.

All these new developments have an impact on the farmers and are hopefully going to encourage the farmers to start with farm record keeping. The farmer as a manager could use the farm records as a valuable tool in the farm planning and decision making process.

4.3 Overview of vegetable production per regions

The southern part of the country is known as the main vegetable production area (Strumica, Gevgelija), followed by the regions surrounding Skopje, Kumanovo, Veles (IPARD Programme, 2007). The most significant as well as traditional crops are tomatoes, peppers, cabbage, melons and watermelons, along with cucumbers and potatoes (IPARD Programme, 2007). Approximately on a total area of around 52.000 ha, 690.000 tones were produced in the period 2000-2006, mainly on open field and plastic tunnels. From the total production of vegetables, in this period, 25% belong to potatoes, along with 18% tomato and peppers separately, 17% of watermelon, followed by cabbage 10%, cucumbers 5% and 4% of onion, whilst the rest of it belongs mainly to beans, peas, leeks, eggplants etc (IPARD Programme, 2007).

The regions of Strumica, Valandovo, Gevgelija, Dojran, Kavadarci, Demir Kapija, Veles and Sveti Nikole are the places where the major production of *tomato* is attained (around 80%). In the last few years, due to the modern technology, the production of tomato in greenhouses and plastic tunnels is growing constantly and is resulting in increased income (MAASP, 2007). However the area planted with tomatoes in the last 5 years shows a decreasing trend as a result of an increased orientation to production in greenhouses and plastic tunnels with investments in the dripping irrigation system. The area planted with tomatoes in 2005 was 5.769 ha whilst the area harvest was 57.28 ha. Although the planted area and the harvest of tomato are declining, still the yield per hectare is rising in comparison with 2005. In 2006, the average yield per hectare was 25 tones while in 2005 it was 20 tones (State Statistical Yearbook, 2007).

The *pepper* is one of the traditional products in Macedonia. The main production of pepper is in Strumica, Radovish, Polog, Skopje and Kumanovo regions (Jankulovski, 1997). Like in the case of tomatoes, the production of peppers is mostly in plastic tunnels and greenhouses. Despite the consumption of fresh pepper, the major part of the production of peppers can be found processed on the markets as frozen pepper, dried pepper, pepper in vinegar and as the traditional Macedonian product – pepper paste *ajvar*. The area sown and harvested has increased over the time: from 7.506 ha sown with this crop in 2002 to 8.332 ha in 2006, whereas the harvested area in 2002 was 7.450 ha and in 2006 it reached 8.313 ha.

Watermelons and melons in Macedonia are produced on an area of 13.047 ha (Annual Agriculture Report, 2006). In the recent years the production of watermelons and melons along with the area sown planted and harvested is declining as a result of the low prices. Yet, in 2006 the total yield was 129 tones and the yield per hectare was 20 tones (State Statistical Yearbook, 2007).

The situation with *cabbage* production is the same as the production of watermelons and melons. Generally, the area planted with cabbage is decreasing due to the low market prices. The area sown with cabbage in 2006 was 3.149 ha and the harvested area was 3.132 ha. In 2006 the average yield extended to 21 tones per hectare of the total harvested area (State Statistical Yearbook, 2007).

Macedonia is divided in eight regions (Skopje region, North- East, East, South-east, Vardar region, Polog region, South-West and Pelagonija region) within 84 municipalities (State Statistical Office, 2007). Please find below the total sown and harvested areas of crops in each region.

Figure 6 Area of vegetables per regions

5 The empirical study

The empirical study, as the theory above reveals, is divided in two main parts: enterprise budget calculations and farm business planning model. Correspondingly, each part begins with acquired data from the advisor's recommendations from the Advisory group, based on which the enterprise budgets and farm business model were developed. Subsequently, each part is followed by the findings from the field test, presented and compared with the developed enterprise budgets and farm business model.

5.1 Development of enterprise budgets

Since theory explains in detail the farm business model and the enterprise budgets, for which accurate recorded data is needed, introduced by SLU for the Swedish conditions, the provided enterprise calculations were modified and adjusted in order to become applicable for the new set of Macedonian conditions. Additionally, enterprise budget calculations for the most produced vegetable crops in the country such as tomato, pepper, cucumber, cabbage and watermelon were provided.

Furthermore, the overall data, as the methodology part explained, is based on the panel analysis along with advisors suggestions and is not gathered from an actual farm, except for the field test data. The major findings of the enterprise budgets are presented below in the next sections.

5.1.1 Land

In order to become applicable for the Macedonian conditions, some adjustments concerning enterprise budgets calculations were made. One of the changes that were made was the cancellation of the possibilities to choose between different support regions and the P and K soil fertility; furthermore, changes in the production scale options were made. These substitutions were made since Macedonia lacks a classification of the soil according to the P and K fertility, as well as arrangement of different support regions. Currently, Macedonia is facing a serious plot size problem, due to the limitations of the usage of the land and its ownership followed by the traditional custom of dealing with heritage. Consequently, the average size of the individual farms in 2004 decreased to 1.7 - 2.0 ha compared with 1994, when the average size ranged between 2.5 - 2.8 ha. On the other hand, the number of registered agricultural households increased to 195.000 - 200.000 in 2004 whilst the number of agricultural households in 1994 was 178.000 (NARDS, 2007). The problem with the plot size has additionally worsened as a result of the absence of social security and constant market changes, so the smaller household farms with the average size of less than 2 ha and internally more parcellised are producing so much as to satisfy the basic need for food and to provide existence for their family by selling their outputs on the local markets (NARDS, 2007).

Considering the above-mentioned, all enterprise budget calculations are made for an arable land of 1 ha. Since the plots in Macedonia are relatively small, usually not bigger than one decar (0.1 ha), one decar is very often used as the principal land size measure, and for that purpose a column was added in the budgets in order to have the output/input value in Euros

per decar. Additionally, from all the gathered data from the case studies, it followed that none of the agricultural producers had a production on an agricultural land exceeding 1 ha.

5.1.2 Income

The income in the calculated budgets is provided as a function from the obtained yield and the price. Moreover, the additional income that is made through the national subsidies is taken into consideration in the calculations. This section presents the average yield and price for every crop vegetable from the panel analysis along with the available direct payments.

Yield

Although the production of the vegetable crops is on small parcels often smaller than 1 ha, they are still the main cultivated and most produced crops of around 30% of the total area by the family farmers (Country Report, 2007). Most often, the crops that are subject of this study are produced in plastic tunnels or greenhouses. In addition, new progress in the production under plastic tunnels was introduced that has resulted in increasing the overall yield. These technical developments consist of the use of double skin plastic tunnels, dripping irrigation system and environment control systems (Country Report, 2007).

As the methodology part disclosed, the data used for the yield is based on the panel analysis and the propositions from the advisors. It is evident that the agricultural company (registered farmer) obtains greater yield (see Table 1). The logic behind is that the registered farmer is usually more organized, uses modern equipments, has more information about the improvements in the technology, has news regarding novelties etc. Moreover, as a replacement of the option to choose between the productions scales, the alternatives of farm family (family farmer) and agriculture company (registered farmer) are implied. The difference between these two alternatives is that if it is an agriculture company the yield per hectare and the prices per kilos are increased, as recommended by the advisory group (see Appendixes 1-5).

Table 1 Yield per hectare, in kilos

	Type of farm	
Crop	**Family farm**	**Agricultural company**
Cabbage	55 000	60 000
Cucumber	140 000	145 000
Pepper	55 000	60 000
Tomato	80 000	85 000
Watermelon	40 000	45 000

Source: Survey data, 2008

Crop prices

The main reason why Macedonian farmers are interested in production of vegetable crops under a plastic tunnel is the price. The price of the crops is characterized by seasonal variations. It reaches its peak in the early season in the period from January - April and is constantly declining till August when the crops produced on an open field are mostly found on the green markets, while in September the price is starting to rise again constantly

(MAASP, 2007). The harvesting season in plastic tunnels for vegetable crops is generally between April and August. Additionally, since Macedonian climate for early vegetables is characterised by an earlier harvesting season of one month compared with the other countries in the region, exports can provide for achieving higher prices (Country Report, 2006). Generally, the price of vegetables crops in the last two years are stabilised as a result of the Macedonian membership in the WTO in 2003 (see Figure 7).

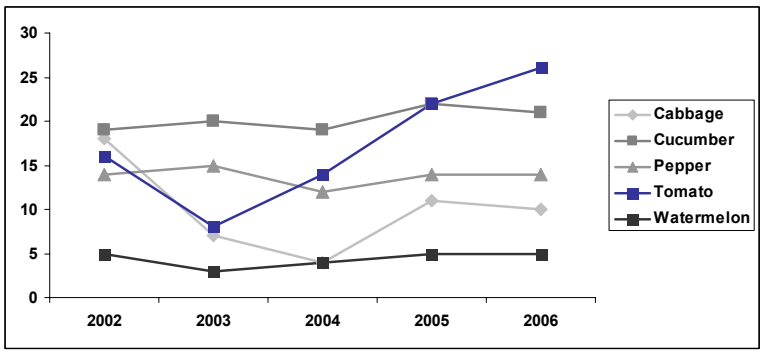

Figure 7 Prices of vegetable crops, in denars per kilos

Source: State Statistical Yearbook

Identical to the yield, the prices of the crops from the 2007 statistical yearbook are used as a guide, whereas in the enterprise budgets the year 2007 is taken as a price index year (see Appendixes 1-5). The same factors as for the yield have an influence on achieving a higher price regarding the production of the registered farmer. Moreover, the registered farmer for the most part grades and sorts the produced crops and sells them directly to the purchasers.

Subsidies

Every year the Ministry of Agriculture, Forestry and Water Economy (MAFWE) allocates from its budget a certain amount of financial support for different measures in agriculture. Until 2004, all the subsidies were paid as guaranteed prices for agricultural products. However, from 2004 the agricultural policy introduced different measures for direct payments.

Regarding the vegetable crops that are subject of this project, in 2002 subsidies for tomatoes and watermelons were approved by the Ministry of Agriculture, Forestry and Water Economy. This support measure was executed by purchasing the entire surpluses from the markets along with additionally paying 2 MKD[5] per kilos to the agricultural producers for each crop separately.

This year (2008), through the recently established Agency for Financial Support in Agriculture and Rural Development (Payment Agency), the Programme for financial support in agriculture introduced direct financial support measure for the production of tomatoes, peppers, cucumbers and cut flowers, produced under controlled conditions (plastic tunnels and glasshouses). The purpose of this measure is to increase the covered areas under plastic tunnels and glasshouses, as well as to improve the market supply of these crops on the national as well as the international markets. All individual family farmers (non-registered and registered) and all legal entities whose primary occupation is agricultural production can

[5] MKD - Macedonian denar is the currency in Republic of Macedonia with a rate of 61,5 MKD ≈ 1€

apply for this subsidy, if they have a minimum of 0,3 ha under plastic tunnels or glasshouses and if all the produced amount is sold to registered manufacturers on the domestic market. In addition, this measure includes all the export completed no later than the second half of May 2008. The financial support for this subsidy is 50.000 MKD per hectare. In addition, from a total of 52.000 farmers that applied for certain direct support measures from the Programme for Financial Support in Agriculture, 144 agricultural producers applied for this subsidy with a total arable land of 355 hectares. This support measure includes only the early production of vegetable crops, which can be identified as the main reason for the small number of applicants.

All the above indicates the need for introducing new suitable options that were found useful and applicable for the Macedonian agriculture. One of the options that we applied is "NARDS (National agriculture and rural development strategy) subsidy scheme", with eligible and non-eligible alternatives. The eligible alternative applies if national subsidy is available, and the non-eligible alternative applies in the opposite case (see Appendixes 1-5).

The second alternative that was applied is closely related to the previous one, and it is connected to other subsidies that are available. Currently, another subsidy that is available for Macedonian farmers is the financial support for compensation of part of the costs for fuel in the amount of 2 000 MKD per hectare. The minimum required arable land is 0,5 ha for every crop separately (see Appendixes 1-5).

5.1.3 Variable costs

Variable costs and the adjustments applied to enterprise calculations will be part of this section. Moreover, changes were made concerning the separate costs. Some additional costs were applied in relation to packaging. Additionally, as mentioned above, costs for water irrigation fee and water irrigation pump were introduced, as well as for every other operation regarding fuel costs.

Seeds

Seeds inputs are mostly imported from neighbouring countries, especially from Serbia, Montenegro, Bulgaria and Greece. However, part of the farmers is still producing insignificant quantities of these inputs in order to meet the needs of the planned production (Country Report, 2007).

In the panel based enterprise budgets, the normative for the seeds for the crop vegetables were specified. For the cabbage the normative for one hectare is 500g with an average price of 12.000 MKD per kilo (6.000 MKD for 1ha) (see Appendix 1). The normative for the cucumber is 30.000 seed units costing 5-6 MKD per unit. The average price for cucumber seed is applied (see Appendix 2). The recommended practice of seed for the pepper is 60.000 units per hectare (60 bags) with a price of 3.200 MKD per bag. One bag is intended for 1.000 seed units (see Appendix 3). The tomato normative for a hectare is 40.000 seed units or 40 bags costing 3.500 MKD per bag. Same as for cucumber, one bag is intended for 1.000 seed units (see Appendix 4). On the other hand, the seed normative for the watermelon per hectare is 1.200g costing 2.250 MKD or 1.875 MKD per kilos (see Appendix 5).

Fertilizers

With the intention of achieving accurate budgets calculations, the costs of various types of fertilizers should be taken into consideration. All normative assigned were approved by the Advisory Group. The normative of NPK for one hectare ranges between 200 - 600 kilos costing between 1.300-1.400 MKD per bag (see Table 2 below). One bag contains 50 kilos (see Appendixes 1-5). Additionally, the vegetable crops are fertilized in spring with nitrogen fertilizer (CAN, urea etc.), and if dripping irrigation system is used, then around 100 l of crystal fertilizer are used (See Table 2 below).

Table 2 Quantities of fertilizers used, in kilos

	Type of fertilizer			
Crop	NPK	N	Fertilizer for irrigation system	Other fertilizer
Cabbage	200	200	100	40 000
Cucumber	400	200	100	50 000
Pepper	600	200	100	/
Tomato	500	130	100	/
Watermelon	300	150	100	/

Source: Survey data, 2008

Fuel

In this part of the calculations the costs for fuel for each separate operation are presented. In correlation with this, an adjustment was made concerning the machinery used. Two possibilities were considered in the budgets: rented and owned machinery. If the rented machinery possibility is chosen then costs for soil cultivation are incurred, and if it is the other alternative, costs for tractor fuel for separate operations are incurred. Sequentially, the costs for all operations for every crop separately range between 95 - 180[6] liters of fuel if own machinery is used (see Table 3). On the other hand, machinery services for tractor cost around 5.000 MKD and the service of cultivator use cost approximately 2.500 MKD (see Appendixes 1-5). However, the recent increase in fuel prices relativises the values used in the enterprises budgets.

Table 3 Usage of fuel per hectare, in liters

	Type of operation								
Crop	Ploughing	Ploughing over	Disking	Harrowing	Furrowing	Mechanical polination	Mechanical seeding	Other	Total
Cabbage	18	18	15	15		38	65	10	***179***
Cucumber	18	18	15	10	10	19		10	***100***
Pepper	20	20	15	15	10	19		15	***114***
Tomato	18	18	15	15	15			15	***96***
Watermelon	18	18	15	10	20		12	48	***141***

Source: Survey data, 2008

[6] 1 liter of fuel costing 61,5 MKD ≈ 1€

Fungicides and insecticides

The enterprise budget calculation based on panel analysis also includes the separate costs for fungicides and insecticides. Below in the table presented are the costs in MKD for every crop regarding the fungicides and insecticides used (see Appendixes 1-5).

Table 4 Costs for fungicides and insecticides, in denars/ha

Crop	Fungicides	Insecticides	Total
Cabbage	6 700	11 900	18 600
Cucumber	12 000	12 150	24 150
Pepper	13 400	11 050	24 450
Tomato	13 400	11 050	24 450
Watermelon	12 000	12 150	24 150

Source: Survey data, 2008

Transport (freight)

The transport costs in enterprise budgets are calculated in workdays[7]. Here follows a figure with the required workdays separately for each crop.

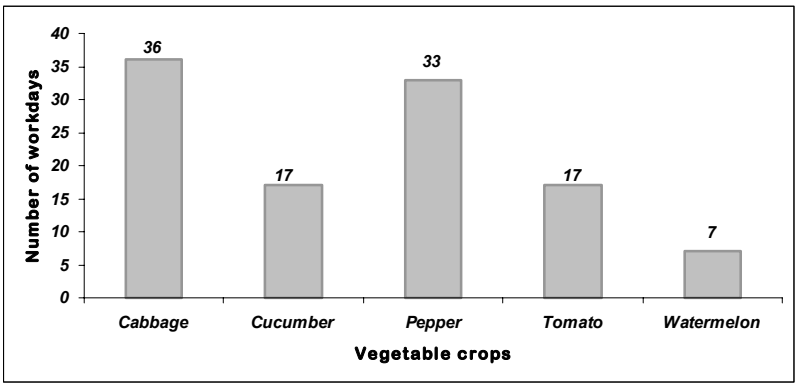

Figure 8 Number of required workdays per crop

Source: Survey data, 2008

Packaging

The costs for packaging are closely related to the obtained yield. Depending of the crop different type of packaging is used. For instance, crates are used for packaging tomatoes. One crate is intended for 10 kilos, costing 20 MKD each (see Appendix 4). Furthermore, plastic bags are used for packaging other vegetable crops, costing 6 MKD per bag where one bag is intended for 6 kilos (see Appendix 1).

[7] Workday is costing ≈500 MKD or 8,15€ (see Appendixes 1-5)

Irrigation

Depending on the irrigation system used, there is a possibility to choose between dripping irrigation system and the traditional system. If dripping irrigation system is used then additional 100 kg of crystal fertilizer are used, along with the cost of water for the irrigation pump. In addition, if traditional irrigation system is chosen, the cost of water for the irrigation fee is incurred.

Harvesting

In the same way as the variable costs for freight, harvesting costs are derived from the number of workdays and the costs per workday (see Appendixes 1-5). In addition, the number of workdays ranges from 20 for the watermelon to 250 for the cucumber (see Figure 9 below).

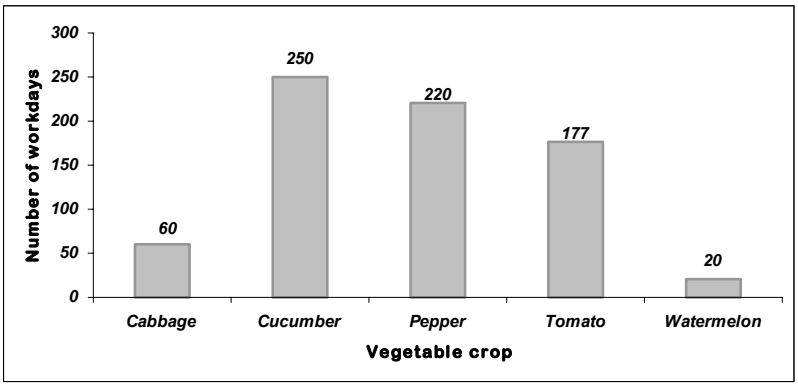

Figure 9 Number of workdays per vegetable crop

Source: Survey data, 2008

5.1.3 Fixed costs

This section describes the separate fixed costs that are related to a specific enterprise. Furthermore, these costs include the specialised machinery maintenance, depreciation costs and the costs for working hours.

Machinery - maintenance, depreciation and interest

The depreciation for the machinery for all budget crops is based on the functional depreciation method for tractor IMT 539 with 29KW.

Additionally, machinery maintenance is based on a lump sum and it amounts to 12.000 MKD along with the required hours of interest, machinery (see Appendixes 1-5).

Labour

The labour requirements are calculated as a product of the number of workdays for every vegetable crop and the wages per day for each worker. The number of workdays is defined approximately in consultation with the Advisory Group and it ranges between 15 workdays for the cabbage and the watermelon and 25 - 40 workdays for the pepper, tomato and cucumber.

Gross margins

This part includes the three levels of the gross margins provided in the budget calculations. The total gross margins along with the gross margins per kilos for the family farmer and for the registered farmer separately for the vegetable crops will be presented further in this section. In addition, the combination of the alternatives between the machinery and irrigation system used will be addressed (see Appendixes 1-5). The gross margin per kilos is derived from the total gross margin per hectare divided by the yield per hectare.

Table 5 Different alternatives of gross margins for cabbage, in euros (family farmer)

Type of farmer		Vegetable crop	Own machinery		Rented machinery	
Family farmer			Dripping system	Traditional system	Dripping system	Traditional system
GM 1	Total	Cabbage	6 435	6 686	6 369	6 620
	kg		0,1170	0,1216	0,1158	0,1204
GM 2	Total		6 238	6 488	6 172	6 423
	kg		0,1134	0,1180	0,1122	0,1168
GM 3	Total		6 095	6 346	6 030	6 280
	kg		0,1108	0,1154	0,1096	0,1142

Source: Survey data, 2008

Table 6 Different alternatives of gross margins for cabbage, in euros (registered farmer)

Type of farmer		Vegetable crop	Own machinery		Rented machinery	
Registered farmer			Dripping system	Traditional system	Dripping system	Traditional system
GM 1	Total	Cabbage	8 224	8 475	8 159	8 410
	kg		0,1371	0,1413	0,1360	0,1402
GM 2	Total		8 027	8 278	7 962	8 213
	kg		0,1338	0,1380	0,1327	0,1369
GM 3	Total		7 885	8 135	7 819	8 070
	kg		0,1314	0,1356	0,1303	0,1345

Source: Survey data, 2008

As it was explained above, since the registered farmer obtains higher yield and higher price from the production, it follows logically that the gross margins of the registered farmer are greater. From all four alternatives introduced, it is conspicuous that the gross margins are slightly larger with the alternative of traditional irrigation system than with the other two alternatives. This can be seen from the fact that the costs for the traditional system are smaller whilst the costs for the dripping system are higher since, as was mentioned above, additional costs of fertilizer are incurred (see Appendixes 1-5). Subsequently, the gross margin computed with the alternatives of own machinery and traditional way of irrigation is little greater than the gross margin with rented machinery and traditional system, since for the rented machinery besides the costs for fuel the service is also to be paid. On the other hand, there is not big difference between the gross margins per kilo. The comments listed above are related to all crops.

Table 7 Different alternatives of gross margins for cucumber, in euros (family farmer)

Type of farmer		Vegetable crop	Own machinery		Rented machinery	
Family farmer			Dripping system	Traditional system	Dripping system	Traditional system
GM 1	Total	Cucumber	26 064	26 416	25 919	26 271
	kg		0,1862	0,1887	0,1851	0,1876
GM 2	Total		25 864	26 216	25 719	26 071
	kg		0,1847	0,1873	0,1837	0,1862
GM 3	Total		25 558	25 910	25 413	25 765
	kg		0,1826	0,1851	0,1815	0,1840

Source: Survey data, 2008

Table 8 Different alternatives of gross margins for cucumber, in euros (registered farmer)

Type of farmer		Vegetable crop	Own machinery		Rented machinery	
Registered farmer			Dripping system	Traditional system	Dripping system	Traditional system
GM 1	Total	Cucumber	29 630	29 982	29 485	29 837
	kg		0,2043	0,2068	0,2033	0,2058
GM 2	Total		29 430	29 782	29 285	29 637
	kg		0,2030	0,2054	0,2020	0,2044
GM 3	Total		29 124	29 476	28 979	29 331
	kg		0,2009	0,2033	0,1999	0,2023

Source: Survey data, 2008

In addition, the GM 1 is higher than the other two gross margins in the view of the fact that it includes only the variable costs, whereas the GM 2 and GM 3, although they include the variable costs, they take into account fixed costs too, such as the specialised machinery maintenance and depreciation.

Table 9 Different alternatives of gross margins for pepper, in euros (family farmer)

Type of farmer		Vegetable crop	Own machinery		Rented machinery	
Family farmer			Dripping system	Traditional system	Dripping system	Traditional system
GM 1	Total	Pepper	21 285	21 637	21 154	21 506
	kg		0,3870	0,3934	0,3846	0,3910
GM 2	Total		21 087	21 438	20 956	21 307
	kg		0,3834	0,3898	0,3810	0,3874
GM 3	Total		20 862	21 214	20 731	21 083
	kg		0,3793	0,3857	0,3769	0,3833

Source: Survey data, 2008

Table 10 Different alternatives of gross margins for pepper, in euros (registered farmer)

Type of farmer		Vegetable crop	Own machinery		Rented machinery	
Registered farmer			Dripping system	Traditional system	Dripping system	Traditional system
GM 1	Total	Pepper	24 728	25 079	24 597	24 948
	kg		0,4121	0,4180	0,4099	0,4158
GM 2	Total		24 529	24 881	24 398	24 750
	kg		0,4088	0,4147	0,4066	0,4125
GM 3	Total		24 305	24 656	24 174	24 525
	kg		0,4051	0,4109	0,4029	0,4088

Source: Survey data, 2008

The plastic tunnel production of pepper achieves slighlty smaller gross margins than the gross margins of the cucumber, mainly beacuse the higher yield of the cucumber. However, the gross margins of the pepper and the cucumber are almost four times higher than the cabbage gross margins. The average gross margin for the cabbage is approximatlly 0,11 euros per kilos for the family farmer and around 0,13 euros per kilos for the registered farmer. This can be a result of the significantly lower price for the cabbage (see Figure 7) compared wtih the prices for cucumber and pepper.

Table 11 Different alternatives of gross margins for tomato, in euros (family farmer)

Type of farmer		Vegetable crop	Own machinery		Rented machinery	
Family farmer			Dripping system	Traditional system	Dripping system	Traditional system
GM 1	Total	Tomato	16 420	16 950	16 290	16 820
	kg		0,2053	0,2119	0,2036	0,2103
GM 2	Total		16 222	16 752	16 092	16 622
	kg		0,2028	0,2094	0,2011	0,2078
GM 3	Total		15 874	16 405	15 744	16 275
	kg		0,1984	0,2051	0,1968	0,2034

Source: Survey data, 2008

Table 12 Different alternatives of gross margins for tomato, in euros (registered farmer)

Type of farmer		Vegetable crop	Own machinery		Rented machinery	
Registered farmer			Dripping system	Traditional system	Dripping system	Traditional system
GM 1	Total	Tomato	19 124	19 655	18 994	19 525
	kg		0,2250	0,3276	0,3166	0,3254
GM 2	Total		18 926	19 457	18 796	19 327
	kg		0,2227	0,3243	0,3133	0,3221
GM 3	Total		18 578	19 109	18 448	18 979
	kg		0,2186	0,3185	0,3075	0,3163

Source: Survey data, 2008

In full view, the tomato gross margins are highest after cucumber and pepper, mainly owing to the fact that the cucumber reaches higher yield per hectare, whilst the pepper production has lower separate costs 1. Furthermore, the high gross margins are attributable to the very good prices of the tomato reached over the last few years (see Figure 7).

Table 13 Different alternatives of gross margins for watermelon, in euros (family farmer)

Type of farmer		Vegetable crop	Own machinery		Rented machinery	
Family farmer			Dripping system	Traditional system	Dripping system	Traditional system
GM 1	Total	Watermelon	2 857	2 989	2 753	2 885
	kg		0,0714	0,0747	0,0688	0,0721
GM 2	Total		2 610	2 743	2 506	2 639
	kg		0,0653	0,0686	0,0627	0,0660
GM 3	Total		2 468	2 600	2 364	2 496
	kg		0,0617	0,0650	0,0591	0,0624

Source: Survey data, 2008

Table 14 Different alternatives of gross margins for watermelon, in euros (registered farmer)

Type of farmer		Vegetable crop	Own machinery		Rented machinery	
Registered farmer			Dripping system	Tradditional system	Dripping system	Traditional system
GM 1	Total	Watermelon	3 562	3 694	3 458	3 590
	kg		0,0791	0,0821	0,0768	0,0798
GM 2	Total		3 315	3 448	3 211	3 344
	kg		0,0737	0,0766	0,0714	0,0743
GM 3	Total		3 173	3 305	3 069	3 201
	kg		0,0705	0,0734	0,0682	0,0711

Source: Survey data, 2008

Compared to the other crops gross margins, the gross margins of watermelon show the lowest values. Identically to the other comparisons mentioned above, the main reason for this is the significantly smaller prices over the period than the other crop vegetables. In addition, fuel costs in the watermelon production come second after cabbage compared with the other crops.

5.2 Development of the farm business planning model

For the purpose of making a precise farm plan, the panel based enterprise budgets calculations were used, but with an adjustment to the farmer's crop production land.
In addition, the data from the farm tests is used for the required data regarding the fixed assets. The established models are presented in detail below in the text.

5.2.1 Production structure of the field test farms

As it was mentioned in the introduction to the empirical findings for the enterprise budgets, Macedonian vegetable farms are small and consist of total area between 1,7 – 2 ha, where as especially tunnel production is characterized by production on small areas.

Table 15 Farmers profile of the production area, in ha

Type of farmer	Cabbage	Cucumber	Pepper	Tomato	Watermelon	Total area
Experienced farmer	0,20		0,20	0,12	0,15	0,57
Family farmer			0,10	0,05		0,15
Registered farmer		0,05		0,20		0,25
Young farmer	0,05			0,03		0,08

Source: Survey data, 2008

All produced crops are on an area less than one decar or around one decar. It is also noticeable that all farmers from the case studies are producing tomatoes as a result of the high return of the production. Furthermore, the registered farmer is the only one who produces cucumber, where as only the watermelon is produced by the experienced farmer.

5.2.1 Working capital

The working capital in the business plan for each crop is calculated as the function of the production area and the working capital per unit. The sum of the working capital of the crops presents the total working capital. The total working capital of the farmers from the case studies ranges between 27 Euros for the young farmer to 603 Euros for the experienced farmer.

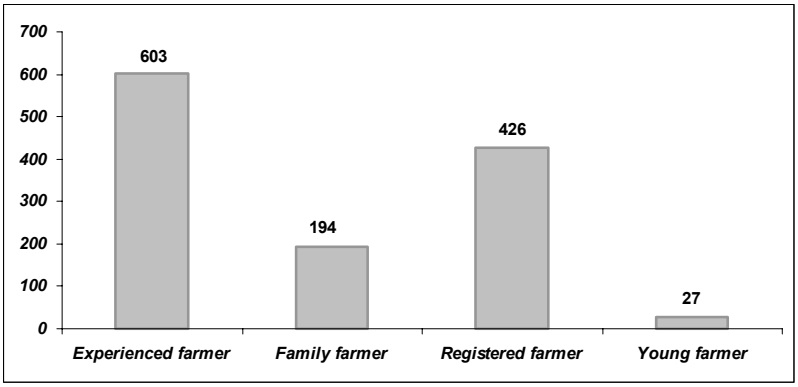

Figure 10 Working capital per farmer

Source: Survey data, 2008

Since the working capital is directly related to the size of the production land, the experienced farmer obtained the higher working capital since he produces on a larger production area compared to the other farmers. On the opposite side, the same as with the experienced farmer, the young farmer has the lowest value of working capital, mainly due to the small production plots. Additionally, cabbage has the smallest working capital per unit.

5.2.2 Gross margin

Correspondingly to the working capital, the gross margin per crop is computed by multiplying the area of production and the gross margin per unit. Subsequently, the total gross margin presents the sum of all produced crops by the farmer.

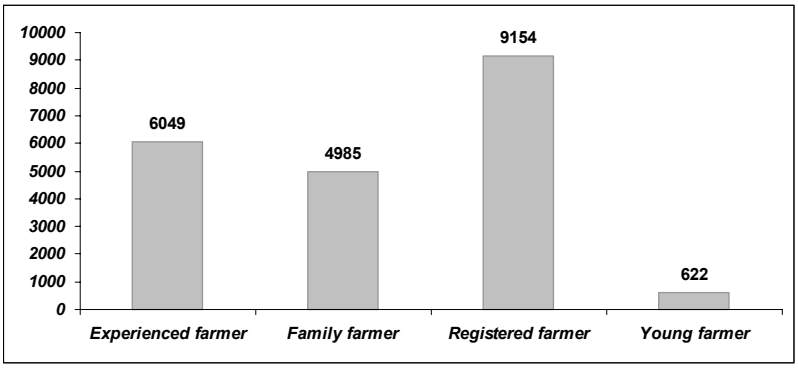

Figure 11 Total gross margin per farmer

Source: Survey data, 2008

What is interesting to notice is that although the experienced farmer produces more enterprise crops on a larger cultivated land, still the registered farmer achieved greater gross margin as a result of that the vegetable crops produced by the registered farmer have the highest gross margin among all crops part of this study. In addition, the young farmer obtains the lowest gross margin.

5.2.3 Number of workdays

The same procedure is used for calculating the total labour requirements as for the total working capital, but using the number of workdays per unit. Moreover, the total labour requirements indicate the total annual requirements on the farm. Similarly as with the working capital, the experienced farmer has a greater need for labour force. In addition, the production of tomato and cucumber requires most workdays. Subsequently, the expenses for the employed workers are taken into account and are reduced from the total gross margin.

5.2.4 Maintenance

The maintenance requirements are calculated in this part of the business plan. The data for maintenance can be obtained from book-keeping, previously calculated values based on the available resources and from standard figures. Here the maintenance of the buildings, building fittings, land improvements and equipment are taken into consideration.

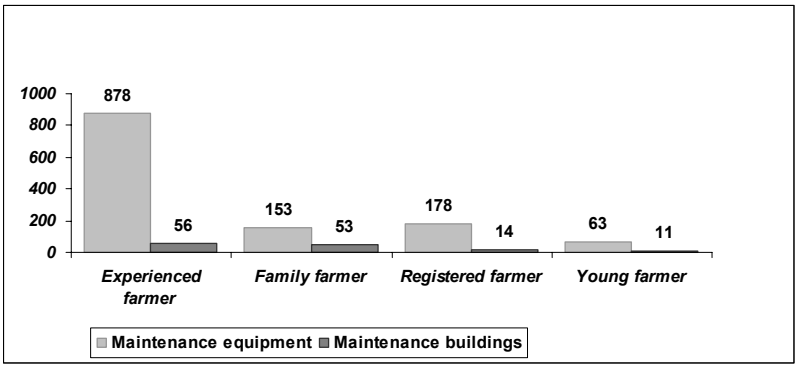

Figure 12 Costs for maintenance

Source: Survey data, 2008

In the above figure, the maintenance expenses for each farmer separately are presented. It is evident that the equipment expenses are much higher than the costs for building maintenance. The reason for this is that almost all farmers have only one storage facility and more machinery (see Appendixes 13-16). In addition, neither of the farmers have maintenance costs for building fittings nor land improvements.

5.2.5 Income before depreciation

The farm business planning model takes into account the costs that are not part of the enterprise calculation. These costs include the costs for transport, fuel, miscellaneous, administration costs, insurances, rents, advisory services etc. Moreover, these costs along with the maintenance costs and the costs for employed labour are excluded from the total gross margin and the obtained result presents the income before depreciation. Additionally the income before depreciation is calculated as the difference between the total income and the total costs.

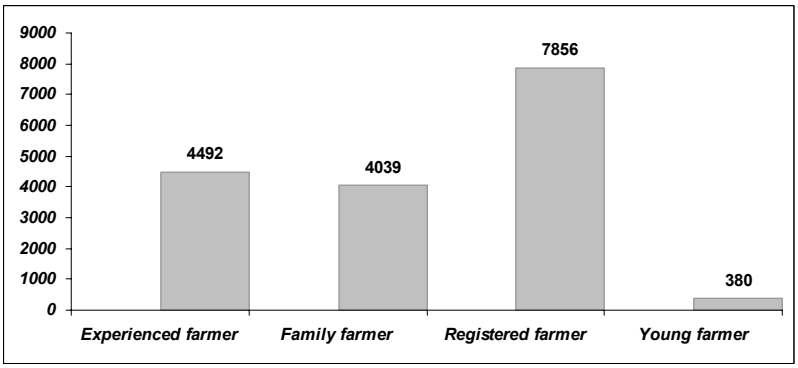

Figure 13 Income before depreciation per farmer

Source: Survey data, 2008

As in the cases of the working capital and labour requirements, the registered farmer has a higher income before depreciation. The logic behind this is, as it was explained above, the amount of the total gross margin achieved by the registered farmer. On the other hand, the young farmer has the smallest amount of income before depreciation since he produces on the smallest plot area and has the lowest total gross margin (see Appendix 16). Furthermore, the income before depreciation can be further used for personal withdrawal, interest payments, reinvestment, savings etc.

5.2.6 Depreciation

Depreciation indicates the annual depreciation requirements and can be used for reinvestments, amortization etc. All farmers have depreciation for the plastic tunnels of 2000 Euros and for the dripping system of 1100 Euros included in the machinery depreciation, except the young farmer since he has a traditional irrigation system. Other depreciation that occurs is for the buildings and the equipment. The highest costs for depreciation occurred to the experienced farmer, whereas the lowest to the young farmer.

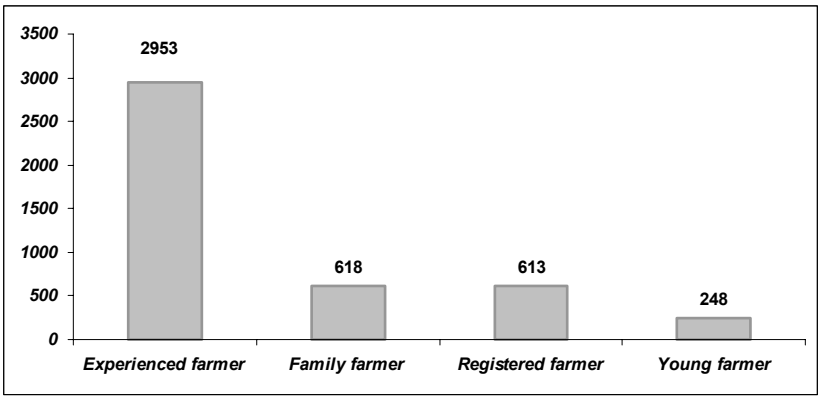

Figure 14 Costs for depreciation per farmer

Source: Survey data, 2008

5.2.7 Income after depreciation

The income after depreciation is computed as the difference between the income before the depreciation and the depreciation. Below in the figure one can see the achieved income after depreciation per farmer. Same comments from the income before depreciation section also apply to this part. Also and here the registered farmer had the highest income after depreciation, since he also had a significantly high income before depreciation compared with the other farmers. Furthermore, he also obtains higher income after depreciation as a result of very low depreciation costs (see Figure 13 and 14).

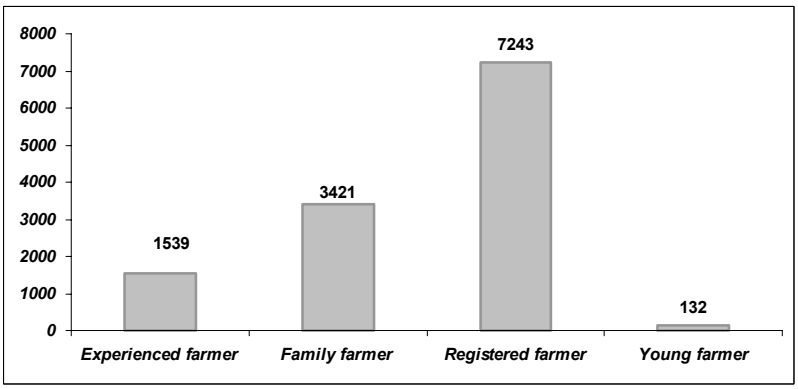

Figure 15 Income after depreciation per farmer

Source: Survey data, 2008

5.2.8 Profit and loss statement

This section illuminates the quantities of the produced products along with the inputs used. Furthermore this part also includes the percentage contribution of the separate crops in the total income and the percentage of the inputs comprised in the total costs (see Appendixes 13-16).

Table 16 Percentage contribution of the crops in the total income per farmer, in Euros

Type of farmer	Cabbage		Tomato		Pepper		Watermelon		Cucumber		Total	
	Value	*%*	*Value*	*%*	*Value*	*%*	*Value*	*%*	*Value*	*%*	*Value*	*%*
Experienced	820	9	2361	25	5902	62	492	4			9574	100
Family			984	16	5164	84					6148	100
Registered			9836	84					1902	16	11738	100
Young	361	38	590	62							951	100

Source: Survey data, 2008

The percentage contribution of the different crops is proportional to the production scale, the yield and the obtained price. Logically follows that the registered farmer obtains the highest income, whilst the young farmer has the lowest income (see Appendix 16). Moreover, the tomato has the larger contribution in the total yield since it is produced on greater production plots, and it has a higher price as well (see Appendixes 13-16). For instance, compared to the cabbage production of the youmg farmer, although the cabbage is produced on a larger production scale, still the contribution of the tomato in the total yield is much gretaer (62%) than the cabbage percentage contribution (38%), given that the cabbage obtains low market prices. On the other side, the pepper contribution of the experienced farmer is higher (62%) compared to the tomato (25%), whereas the size of the production plot influence the crops' contribution in the total income, besides the fact that tomato reaches higher price (see Appendix 13).

Table 17 Percentage contribution of the inputs in the total costs, in Euros

Type of farmer	Seeds		Packaging		Harvesting		Maintanance		Sundry	
	Value	*%*	*Value*	*%*	*Value*	*%*	*Value*	*%*	*Value*	*%*
Experienced	851	17	698	14	658	13	878	17	300	6
Family	259	12	168	8	253	12	153	7	300	14
Registered	607	16	776	20	393	10	178	5	500	13
Young	6	1	101	18	68	12	63	11	80	14

Source: Survey data, 2008

In the table above are presented the costs that have higher contribution in the total costs per farmer. The other costs that are not taken into account are the costs that have small contribution in the total costs often less than 10% (see Appendixes 13-16). Also and here the costs for seeds, packaging and harvesting are directly connected to the size of the production scale. It is visible that the registered farmer and the young farmer have greater packaging costs compared with the other costs. Moreover the costs for harvesting and sundry are almost the same among all farmers, except for the experienced farmer who has lower costs for sundry.

Table 18 The percentage contribution of the assets in the total depreciation

Type of farmer	Buildings		Machinery/inventory		Total depreciation	
	Value	%	Value	%	Value	%
Experienced	320	11%	2633	89%	2953	100%
Family	160	26%	458	74%	618	100%
Registered	80	13%	533	87%	613	100%
Young	60	24%	188	76%	248	100%

Source: Survey data, 2008

Among all farmers the depreciated assets are buildings and machinery. However, the impact of the machinery on the total depreciation is significantly higher than the depreciation of the buildings. The logic behind this is that all farmers mainly have machinery, the only buildings they possess are for storing the produced crops.

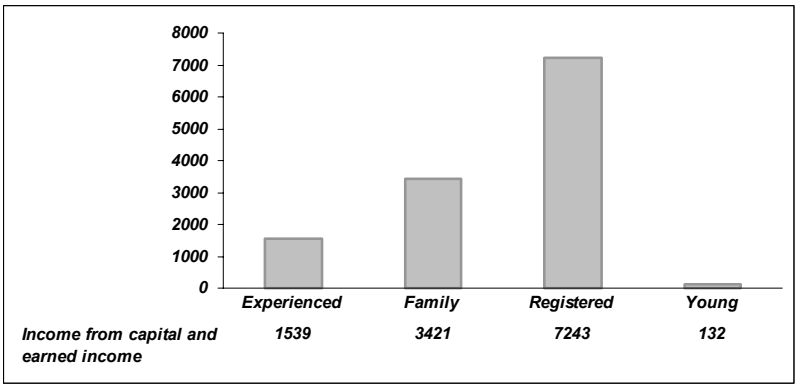

Figure 16 Income from capital and earned income per farmer

Source: Survey data, 2008

The income from capital and earned income presents the difference between the income after depreciation and the total financial incomes and costs. Since neither of the farmers have financial incomes and costs the income from capital and earned income is in correlation with the income after depreciation. From above explicated, logically follows that the registered farmer has greater income from capital and earned income since he has higher income after depreciation (see Appendix 15).

6 Analysis and Discussion

To understand in what manner implementing enterprise budget calculation can help farmers in terms of improving the overall farm business planning a comparison of the panel based enterprise calculations and the enterprise budgets from tested field case studies was assembled.

6.1 Analysis of the production normative

The empirical part explicated the separate parts of the enterprise calculations. This section deploys the differences between the field test calculations and the panel analysis budget calculations.

Table 19 Obtained yield kg/dc

	Panel analysis		***Empirical analysis***			
	Family farmer	***Agriculture company***	***Experienced farmer***	***Family farmer***	***Registered farmer***	***Young farmer***
Cabbage	5 500	6 000	5 000			5 500
Cucumber	14 000	14 500			14 500	
Pepper	5 500	6 000	9 000	10 500		
Tomato	8 000	8 500	8 000	8 000	15 000	8 000
Watermelon	4 000	4 500	4 000			

Source: Survey data, 2008

In the calculations based on the panel analysis it was assumed that the agricultural company attains greater yield and higher prices under assumption that the registered farmer uses more modern equipment than the family farmer.

The registered farmer from the field test budgets achieved significantly higher yield per decar of the tomato crop compared to the enterprise calculations based on panel analysis as a result of the new method of harvesting this crop. Moreover, many factors can influence on the yield of the experienced and the family farmer concerning the pepper crop, that are not part of this study, such as the soil fertility, the production region etc. Additionally, all other crops from the case studies obtained the same yield as the panel based budgets.

Among all farmers from the case studies, only the registered farmer has acquired considerably higher price for the tomato production consequently to the fact that the registered farmer sells the outputs directly to the wholesale distributors. Also, some fluctuations of the crop prices among the farmers can occur as result of the quality of the produced crops, the region of production, the amount of exported crops as well as the amount of imported crops. This was the case with the production of pepper by the experienced and the family farmer. The experienced farmer reached a price of 20 MKD per kilos, whilst the family farmer who achieved a price of 30 MKD per kilos. Furthermore, same follows for the cabbage production produced by the young and the experienced farmer. For instance, in general, the prices in 2008 compared to 2007 have decreasing trend mainly due to the fact that the exported quantity of vegetables was excessive, which influenced on decline of the vegetable prices.

This especially refers to the cabbage crop and the cucumber production. The price of the cucumber attained by the registered farmer is only 14 MKD/kg, which is less than the price of the family farmer (15 MKD/kg) in the panel analysis.

Table 20 Prices of the crops, in MKD/kg

	Panel analysis		Empirical analysis			
	Family farmer	Agriculture company	Experienced farmer	Family farmer	Registered farmer	Young farmer
Cabbage	10	11	5			8
Cucumber	15	16			14	
Pepper	31	32	20	30		
Tomato	18	19	15	15	20	15
Watermelon	5	5,4	5			

Source: Survey data, 2008

As the theory above elucidates, the enterprise budgets calculations are based on the gross margin method. Each level of the gross margin includes three different types of separate costs.

Gross margin = incomes - separate costs

- GM1 = separate incomes - separate costs
- GM2 = GM1 - separate product group costs
- GM3 = GM2 - separate enterprise costs

Furthermore, the theory defines the income as result of the achieved yield and obtained prices. Moreover, additional income can occur in a subsidy scheme. However, of the financial support available this year, no one among the farmers was eligible, taken into consideration that they have a production area less than 0,3 ha (see Table 15), whereas the minimum required production area was 0,3 ha per produced crop and 0,5 ha for the fuel support.

Below are presented the separate costs concerning all farmers form the case studies. Separate costs 1 include the amount of inputs used, such as seeds, fertilizers, pesticides, fungicides, costs for soil cultivation, harvesting, irrigation costs etc. From the table 21 it is recognizable that almost all crops produced by the farmers from the field test have approximately same amount of separate costs 1 compared to the panel analysis budgets with a few exceptions. For instance, the registered farmer had higher costs for fungicides and pesticides in the production of the tomato which is the reason for the extensively larger separate costs 1. The price of the fungicides and the pesticides can influence on the amount of these costs of the registered farmer. In addition, the price of the fungicides and the pesticides is proportional to its quality and origin. For example, the imported fungicides and pesticides products are more expensive.

The separate costs 1 of the experienced farmer regarding the production of cabbage are lower (291 €/dc) contrast to the panel analysis (343 €/dc). The logic behind this is that the experienced farmer used smaller quantity of fertilizer under lower prices. On the other side, the experienced farmer had notably greater costs for the pepper crop, mainly as a result of the greater quantity of crystal fertilizer used and also, since he obtained sustainably higher yield per decar (see Table 19) compared to the panel based budgets, the experienced farmer had larger costs for packaging as well.

Regarding the separate costs 1 of the young farmer, it is perceptible that the costs for the tomato production from the panel analysis are considerably greater than the costs of the young farmer. The logic behind this is in the fact that the young farmer had significantly lower costs for seed material. This can be due to the fact that the young farmer used different variety of seeds and with less quality.

Table 21 Separate costs 1, Euros/dc

	Panel analysis		Empirical analysis			
	Family farmer	Agriculture company	Experienced farmer	Family farmer	Registered farmer	Young farmer
Cabbage	343	345	291			333
Cucumber	921	925			949	
Pepper	752	760	917	771		
Tomato	804	820	761	783	1 055	542
Watermelon	127	127	130			

Source: Survey data, 2008

Table 22 Separate costs 2, Euros/dc

	Panel analysis		Empirical analysis			
	Family farmer	Agriculture company	Experienced farmer	Family farmer	Registered farmer	Young farmer
Cabbage	363	364	310			352
Cucumber	941	945			969	
Pepper	772	780	937	791		
Tomato	824	840	781	803	1 074	562
Watermelon	152	152	155			

Source: Survey data, 2008

The separate costs 2 are including the maintanace of the machinery along with the interest working capital added by the separate costs 1. From all of the above mention regarding the separate costs 1 logically follows that here, the registered farmer for the tomato production and the experienced farmer for the production of pepper would have higher separate costs 2 contrast to the budgets from the panel analysis. Corenspondingly, on the other hand, the produced tomato by the young farmer and the produced cabbage by the experienced farmer would also have lower separate costs 2 compared to the panel analysis. Same as for the separate costs 1, the separate costs 2 for the other production crops produced by the field test farmers are almost the same with the panel based calculations.

Table 23 Separate costs 3, Euros/dc

	Panel analysis		Empirical analysis			
	Family farmer	Agriculture company	Experienced farmer	Family farmer	Registered farmer	Young farmer
Cabbage	377	379	325			367
Cucumber	972	976			1 000	
Pepper	794	802	960	814		
Tomato	858	875	816	837	1 109	597
Watermelon	166	166	169			

Source: Survey data, 2008

Concerning the separate costs 3, calculated as the sum of the machinery depreciation, the required labour and the separate costs 2, what is interesting to distinguish is that the separate costs 1 and 2 of the pepper production by the experienced farmer were substantially higher than the calculated costs from the panel analysis, where as for the separate costs 3 of the same farmer and production are still larger but the difference is not as big as for the other costs. The same comments from the separate costs 1 and 2 are applicable for the separate costs 3.

As it was mentioned in the empirical part the gross margin 1 is in correlation with the achieved yiled and prices. The logic behind the high gross margin 1 of the registered farmer for the tomato production is due to the fact that registered famer had greater yield per decare as a result of the usage of different method of harvesting the crop as well as the higher achived price. Additionally, beside the fact that the registered farmer aquired same yield per decar as the panel analysis, still the gross margin 1 of the cucumber is slightly smaller contrast to the lower attained price by the registered farmer.

Aside from the fact of the slightlly smaller achieved price of the pepper crop produced by the family farmer than the price of the panel based entreprise calculations, the family farmer obtains higher gross margin 1, as a result of the elevated gained yield (see Table 19 and 20). Aside from pepper production, for the tomato production the family farmer aquired lower gross margin 1 primary becasue of the lower price of the tomato (see Table 19 and 20).

Similary to the family farmer, the young farmer and the experinced farmer have a smaller gross margin1 of the tomato crop compared to the gross margin of the panel budgets, even though the young farmer and the experinced farmer achieved the same yield as the panel analysis. This is mainly because of gained lower market price by the young farmer and the experinced farmer.

Even though the production of the pepper resulted with much higher yield for the experienced farmer, still the goss margin 1 is almost the same as the panel calculation, given that the experienced farmer had significantly lower crop price. The watermelon gross margins of the experienced farmer are lower since the experienced farmer had insingnificantly greater separate costs.

In addtion, logically follows that the farmers who were producing cabbage have smaller levels of gross margins since the price of the cabbage compared to the panel budgets was substainally low (almost half of the price of the panel calcucaltions). The gross margins of the other produced crops by the farmers from the case studies were just about the same as with the panel enterprise budgets calculations.

Table 24 Gross margin 1, Euros/dc

	Panel analysis		***Empirical analysis***			
	Family farmer	***Agriculture company***	***Experienced farmer***	***Family farmer***	***Registered farmer***	***Young farmer***
Cabbage	643	822	119			389
Cucumber	2 606	2 963			2 854	
Pepper	2 128	2 473	2 033	4 393		
Tomato	1 642	1 912	1 206	1 184	3 863	1 425
Watermelon	286	356	198			

Source: Survey data, 2008

Table 25 Gross margin 2, Euros/dc

	Panel analysis		Empirical analysis			
	Family farmer	Agriculture company	Experienced farmer	Family farmer	Registered farmer	Young farmer
Cabbage	623	803	99			369
Cucumber	2 586	2 943			2 834	
Pepper	2 109	2 453	2 013	4 373		
Tomato	1 662	1 893	1 186	1 165	3 844	1 405
Watermelon	261	331	173			

Source: Survey data, 2008

Similary to the comments for the gross margin 1, it is logical for the registered farmer for the tomato crop and for the produced pepper by the family farmer to acquire larger gross margin 2. In contrast, the experienced farmer who was producing cabbage and watermelon along with the cabbage production of the young farmer has lower gross margin 2 than the enterprise budget calculations from the panel based analysis.

Table 26 Gross margin 3, Euros/dc

	Panel analysis		Empirical analysis			
	Family farmer	Agriculture company	Experienced farmer	Family farmer	Registered farmer	Young farmer
Cabbage	609	788	85			355
Cucumber	2 556	2 912			2 803	
Pepper	2 086	2 430	1 991	4 350		
Tomato	1 587	1 858	1 152	1 130	3 809	1 370
Watermelon	247	317	159			

Source: Survey data, 2008

The table 26 presents the gross margin 3 for the separate production crops produced by the farmers from the case studies. The above explicated comments with regard to the gross margin 1 and 2 are also related to the gross margin 3.

7 Conclusions

The last chapter of this study addresses the research question depicted in the introductory part of the study. The aim of this study is to perceive the importance of how *collecting farm data* and *calculating the enterprise budgets* can assist in improving the overall farm business management and along with that, farmers' decisions.

The main objectives of this study are as follows:

- Define the production normative on best practice Macedonian farms for the most important vegetables.
- Adapt a farm business planning model in order to facilitate the farmer's decision making process.
- Test a farm business planning model in order to facilitate the farmer's decision making process

7.1 The production normative

With the intention of providing an enterprise budgets calculations that would be applicable to the Macedonian conditions, some adjustments in the empirical part were conducted with regards to the literature review. In addition, in collaboration with the members from the Advisory Group, the normative of the inputs and outputs used in the production of the crops, were assembled. Moreover, in order to get a closer depiction of the present situation of the production normative on the farms, in the analysis and discussion part a comparison between the panel based budget calculations and the calculations based on field test was completed where the main findings were presented.

In general, the principal conclusions regarding the yield are that there weren't any variations between the panel based yield and the yield attained by the farmer concerning all crops. The only dissimilarity that occurred was the yield of the tomato production by the registered farmer and the yield of the pepper production obtained by the family and the experienced farmer. The production of the other crops resulted with the same yield as for the panel calculations. In addition, it can be concluded that the yield in the panel calculations can be distinguished as a production normative.

Overall, the prices of the vegetable crops this year (2008) are having decreasing trend, with the exception of the watermelon price which remained stable. However, the tomato price declined among all farmers, except for the registered farmer who was the only one who succeeded to accomplish a price of the tomato although slightly, but still higher than the panel analysis calculations. Additionally, the price of the cabbage has dropped for the young farmer and also by 50% for the experienced farmer. Moreover, the pepper was only produced by the experienced and the family farmer. In addition, the family farmer achieved almost the same price as the panel analysis, where as the experienced farmer had considerably less price. In conclusion, prices of the crops are changeable over the period and there are many factors that influence on the level of the price, such as the supply and the demand, the export and the import etc.

The concluding comments for the separate costs are that there weren't any significant exclusion compared to the enterprise budget calculations based on the panel analysis. The only variation that occurred in the separate costs 1 regarding the tomato production was in the price of pesticides and fungicides used by the registered farmer and for the seed material costs used by the young farmer. Concerning the production of the pepper crop, it follows that the experienced farmer, since he attained higher yield per decar, had greater costs for packaging. Other disparity that occurred was the quantity of the fertilizer input used in the cabbage production, but nevertheless, this discrepancy wasn't significantly large. The inputs used in the production of the other crops by the rest of the farmers were in correlation with the panel analysis calculations. As it was illuminated in the theory and in the analysis part, logically follows that identical variations transpired in the separate costs 2 and 3 for the crops and for the farmers that have dissimilarity in separate costs 1. Taking into consideration above mention it can be assumed that separate costs perceived in the panel based calculations corresponded to present situation on the field.

In the view of the fact that the gross margin is directly correlated with the incomes and the separate costs of the farmers, the conclusions above explicated are applicable for the gross margins as well. Additionally, since no one of the farmers has obtained any additional yield from subsidies, the only income that succeeded was from the achieved yield. The results from the field test showed that the gross margins for the tomato production among all farmers except for the registered farmer were lower as a result of the overall decreasing trend of vegetable prices. In continuation, the same refers to the production of the cabbage by the young and the experienced farmer. The interesting finding from the results concerning the gross margin was the fact that the experienced farmer even though obtained considerably high yield, still had lower gross margins due to the decreased price of the pepper. Once again, the price had proofed its influence on the final results.

In general, it can be concluded that the assumptions made in the enterprise budget calculations in the panel analysis are applicable in the real life situation, the only discrepancy that can occur is as a result of the variation in the prices of the inputs and the outputs. In addition, it can be concluded that the empirical data support what the Advisory Group suggested, but another yield for the tomato and the pepper production should be assigned and along with that it should be added another version of enterprise budgets as high yield alternative of budget calculation regarding these enterprise crops, since we can conclude if one farmer can succeed to achieve that amount of yield for the tomato and pepper crop also it would be possible for the other farmers to be able to obtain that yield. Thus, the objective of the study is fulfilled (see page 4).

7.2 Modification of the farm business planning model

The basic purpose of this research study was to raise the question regarding the importance of farm record keeping. For the purpose of fulfilling the aim a farm business planning model developed by SLU (Swedish University of Agricultural Sciences) in cooperation with LRF Konsult (The Farmer Union Advisory Company) and Swed Bank (Savings Bank) was adapt.

In order to have an accurate farm business planning model with regards to the Macedonian conditions some adjustments were made in the enterprise budget calculations:

- The possibilities to choose between different support regions and the P and K soil fertility were substitute with the alternative to choose between family farm and agricultural company (registered farmer)
- The calculations were made for an area of 1ha with additionally adding a column for 1 dc
- "NARDS" (National agriculture and rural development strategy) subsidy scheme option was applied, with eligible and non-eligible alternative.
- A subsidy option was added with available and non-available alternative
- Concerning the machinery used, two possibilities were assigned, rented and owned machinery
- Depending of the irrigation system used, a possibility to choose between dripping irrigation system and traditional system was added
- The machinery maintenance is based on lump-sum and the machinery depreciation is based in the functional depreciation.
- In the business planning model and in the enterprise budgets calculations the hours of the required labour were substituted with the workdays
- Additional column with the values in denars was added

Given that the farmers need to plan ahead, the planning function can be seen as one of the most important management functions. Coordinating the actions and making plans in order to realize the aims of the farmer is part of the planning function.

The farm data recorded presents the basic source of information needed for accurate farm business planning. Furthermore, the importance of the record keeping can be seen in its influence in the decision making process. In addition, farm record keeping can improve the decision making process of the farmers, since record keeping describes what has happened previously and moreover, it can be used as basis for future planning. The planning in the decision making process is based on the information about the available options, whereas each option is carefully planned.

In addition, adapting a farm business planning model in the Republic of Macedonia will help farmers to evaluate the financial position of the farm. Moreover the farm manager can get a picture about the incomes and costs and along the profit on the farm. Furthermore, the business planning model can be useful when new investments are planned and what is more it can be used as financial document for a credit loan. All the above mention, leads to the need of adjusting and implanting an accurate farm business planning model in the Republic of Macedonia.

7.3 Testing the modified farm business planning model

Taking into consideration the literature review and the modified farm business planning model as well the empirical findings from its application, generally it can be concluded that there is a lack of knowledge about farm record keeping among the farmers in the Republic of Macedonia. Furthermore, besides the fact that some efforts were done to introduce the farmers with the necessity of record keeping, still those farmers who were familiar with the farm data collection have erroneous image about the difficulty of the process. In addition, continuous recording of the farm data will help farmers to make more enhanced decision in order to improve the profitability of the farm.

The testing of the model should show if such a model adapted to the Macedonian conditions would work and be beneficial. The data used in the model could be valid, reliable and possible to generalize only at one point in time because the technical development changes the recommendations about best practise continuously. The data in the model is based on the advisory recommendations to farmers according to the panel group. This was tested by the case studies, which showed that farmers could reach higher gross margins in the tomato and the pepper production. Thus, the advisory recommendations as well as these enterprise budgets should be revised. The field test showed also that the data collecting through the panel group could miss the practice of the best farmers. Even if the gross margins of the case study farmers should have been in line with the enterprise budgets based on the panel group recommendations, the aim is that data of the farm to be planned should be entered in the model and that the data included in the model should be used only for the coefficients where farm data are missing. The test showed that the model concepts were applicable, so the hypotheses that the model is applicable in the Republic of Macedonia (provided that correct data are used) could be kept.

Farm business planning model helps in deciding which enterprises to produce and in what combination. The farm business planning model gives directions about the weaknesses of the production along with the need of changing the plans on the farm. Additionally, the farm business plan can improve the overall management of the farm by planning the short term future activities as well as the long term. The inputs used, obtained income, the labour requirements and the needed equipment can be accumulated from the farm business plan.

In conclusion, the farm business planning model followed by accurate and continuously record keeping is necessary tool for successfully managing the farm business, which should be taken into practice by the Macedonian farmers. As it was illuminated in the first section of this Chapter, from the assigned farm tests it can be concluded that additional alternative of the enterprise budget as a high version should be provided regarding the production of the pepper and the tomato.

8 Epilogue

Throughout the accomplishment of this study the main question around which the principle deliberation was positioned was “How record keeping and providing accurate enterprise budget calculations by adapting a farm business planning model can help Macedonian farmers to improve their overall managing of the farm?”. Analysing the incomes and the costs on the farm along with the factors influencing when new decisions are made wasn’t part of the research area of the study. Few questions that came into view and which can be found interesting for future research studies and that can be helpful for further development of the farm management and for increasing the efficiency of the Macedonian agricultural production are: “What are the factors that influence on the enterprise budgets? Examining how some variable costs on the farm can be reduced and how the occurrence of any additional costs can be prevented. How providing the farmers with capabilities of comparing the costs and incomes can encourage better decision making? Analysing how farm incomes might increase and how supplementary incomes can be generated.

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Appendixes

Appendix 1: Enterprise budget calculation for the cabbage crop

SLUs

Crop budget **Cabbage**

NARDS Subsidy scheme:	Eligible
Other subsidies:	Avaiable
Machinery:	Own
Irrigation:	Dripping
Indicate production scale	family farm

Incomes and separate costs per hectar

Yield, kg/ha 55 000

Transactions date

			Quant	Price	€	Denars	Decares Yield, kg/dc	Decares €
	INCOMES							
3074	Cabbage	kg	55 000	10,00	9 016,39	550 000	5 500	901,64
3078	Subsidies	€	1	50 000,00	819,67	50 000		81,97
3078	Other subsidies and grants	€	1	2 000,00	32,79	2 000		3,28
		INCOMES, TOTAL			9 868,85	602 000		986,89

SEPARATE COSTS

4010	Seeds, cabbage	g	0,5	12 000,00	98,36	6 000	9,84	08-05-15
4023	NPK Fertilizer	kg	200	27,00	88,52	5 400	8,85	08-07-01
4021	Fertilizer (N)	kg	200	20,00	65,57	4 000	6,56	08-07-05
4020	Other fertilizer for irrigation system	kg	100	150,00	245,90	15 000	24,59	08-07-10
4020	Other fertilizer	kg	40 000	2,00	1 311,48	80 000	131,15	08-07-08
5360	Fuel, tractor (ploughing)	l	18	61,50	18,15	1 107	1,82	08-07-01
5360	Fuel, tractor (ploughing over)	l	18	61,50	18,15	1 107	1,82	08-07-12
5360	Fuel, tractor (disking)	l	15	61,50	15,12	922	1,51	08-07-15
5360	Fuel, tractor (harrowing)	l	15	61,50	15,12	922	1,51	08-07-18
5360	Fuel, tractor (other)	l	10	61,50	10,08	615	1,01	08-07-16
5360	Fuel, tractor (mechanical polination)	l	38	61,50	38,31	2 337	3,83	08-07-19
5360	Fuel, tractor (mechanical seeding)	l	65	61,50	65,53	3 997	6,55	08-07-15
4061	Soil cultivation, contractor (tractor)	times	0	5 000,00	0,00	0	0,00	08-07-20
4061	Soil cultivation, contractor (cultivator)	times	0	2 500,00	0,00	0	0,00	08-07-20
4042	Fungicides	total	6700	1,00	109,84	6 700	10,98	08-09-18
4043	Insecticides	total	11900	1,00	195,08	11 900	19,51	08-09-18
5700	Freight (transport)	workday	36	500,00	295,08	18 000	29,51	08-09-22
4081	Packaging		9 167	1,00	150,28	9 167	15,03	08-09-21
5380	Water for irrigation, fee	ha	0	10 000,00	0,00	0	0,00	08-09-13
5380	Water for irrigation, pump	l	200	61,50	201,64	12 300	20,16	08-09-13
4066	Harvesting	workday	60	500,00	491,80	30 000	49,18	08-09-20
		SEPARATE COSTS 1, TOTAL			3 434,01	209 475	343,40	08-09-28
0000	Tractor, maintenance	h	1	12 000,00	196,72	12 000	19,67	08-09-30
10000	Interest, working capital	€	471	7%	0,54	33	0,05	08-10-01
		SEPARATE COSTS 2,			3 631,27	221 507	363,13	08-10-03

		TOTAL							
0000	Machinery, depreciation + interest	h	1	1 200,00	19,67	1 200		1,97	08-10-05
20000	Labour	workday	15	500,00	122,95	7 500		12,30	08-10-06
		SEPARATE COSTS 3, TOTAL			3 773,89	230 207		377,39	08-10-08
	GROSS MARGIN								
30000	GM 1 = INCOMES - SEPARATE COSTS 1				6 434,84	392 525		643,48	
	GM 2 = INCOMES - SEPARATE COSTS 2				6 237,58	380 492		623,76	
	GM 3 = INCOMES - SEPARATE COSTS 3				6 094,96	371 793		609,50	

	EXAMPLES OF COMMON INCOMES	EXAMPLES OF COMMON COSTS
	Single farm support	Couch grass treatment
		Liming
		Management
		Insurances
		Other cost for machinery

Version 08-MK

Cabbage
Price level 2007

Cabbage: Price, According to Annual Statistical Report 2007.

Seeds: The normative for 1ha is 500 gr. The average price is 12000 denars/kg. (source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Fertilization: The normative for 1ha is 300 kg (10 bags of 50 kg) costing between 1300-1400 denars/bag. Additionally, the cabbage is fertilized in spring with 200kg of nitrate fertilizer (CAN, urea etc), and if dripping irrigation system is used, then around 100l of crystal fertilizer are used. (source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Fungicides: Cost of chemicals, Benfungin 0,1% costing 900 denars; Dakoflo 2,5-3 l costing 1700 denars;Mankogal 80 2,5 kg costing 700 denars; Dakoflo 2,5-3 l costing 1700 denars; Bakarni oksihlorid 50 0,5-0,75%costing 700 denars; Dional 500 SC 0,1-0,2% costing 1000 denars (source: Hromos - Pesticidi & Agrimitko, spring 2008).

Inseticides: Cost of chemicals, Trefgal 1,5-2 l costing 800 denars; Galition G-5 20-25 kg costing 4000 denars; Talstar 10 EC 0,5 l costing 1450denars; Dimetogal 0,05-0,1% costing 500 denars; Abastate 0,075% costing 1950denars; Cipkord 20 EC 0,015-0,03% costing 200 denars; Tonus 0,02-0,025% costing 600 denars; Abastate 0,075% costing 1950 denars; Elisa 0,025-0,05% costing 450 denars (source: Hromos-Pesticicdi & Agrimitko, winter 2008).

Freight (transport): The normative for 55-60 tones yield is 36 workdays costing 500 denars/workday. (source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Packaging: Costs for packaging ranges between 6250-15000 denars. (source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Machinery - maintenance, depreciation and interest:
Machinery depreciation based on the functional depreciation method for tractor IMT 539 29KW.
Machinery maintenance based on lump-sum.

Labour: Labour requirements according to the interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food.

Subsidies: According to NARDS, 2008.

Source: Survey data, 2008

Appendix 2: Enterprise budget calculation for the cucumber crop

SLUs
Crop budget **Cucumber**

NARDS Subsidy scheme:	Eligible
Other subsidies:	Avaiable
Machinery:	Own
Irrigation:	Dripping
Indicate production scale	family farm

Incomes and separate costs per hectar — Yield, kg/ha 140 000

			Quant	Price	€	Denars	Decares Yield, kg/dc	Decares €	Transactions date
denars	**INCOMES**								
3077	Cucumber	kg	140 000	15,00	34 426	2 099 986	14 000	3 442,60	08-08-03
3078	Subsidies	€	1	50 000	819,67	50 000		81,97	
3078	Other subsidies and grants	€	1	2 000	32,79	2 000		3,28	
	INCOMES, TOTAL				35 278	2 151 958		3 527,80	
	SEPARATE COSTS								
4010	Seeds, cucumber	nr	30 000	6,00	2 950,82	180 000		295,08	08-01-23
4023	NPK Fertilizer	kg	400	27,00	177,05	10 800		17,71	08-04-01
4021	Fertilizer (N)	kg	200	20,00	65,57	4 000		6,56	08-04-18
4020	Other fertilizer	kg	50 000	2,00	1 639,34	100 000		163,93	08-04-20

4020	Other fertilizer for irrigation system	kg	100	150,00	245,90	15 000	24,59	07-10-12
5360	Fuel, tractor (ploughing)	l	18	61,50	18,15	1 107	1,82	07-10-05
5360	Fuel, tractor (ploughing over)	l	18	61,50	18,15	1 107	1,82	07-10-23
5360	Fuel, tractor (disking)	l	15	61,50	15,12	922	1,51	08-03-05
5360	Fuel, tractor (harrowing)	l	10	61,50	10,08	615	1,01	08-03-10
5360	Fuel, tractor (other)	l	10	61,50	10,08	615	1,01	08-01-03
5360	Fuel, tractor (furrowing)	l	10	61,50	10,08	615	1,01	08-04-08
5360	Fuel, tractor (mechanical pollination)	l	19	61,50	19,16	1 169	1,92	08-04-05
4061	Soil cultivation, contractor (tractor)	times	0	5 000,00	0,00	0	0,00	08-03-30
4061	Soil cultivation, contractor (cultivator)	times	0	2 500,00	0,00	0	0,00	08-03-30
4042	Fungicides	total	12000	1,00	196,72	12 000	19,67	08-07-29
4043	Insecticides	total	12150	1,00	199,18	12 150	19,92	08-07-29
5700	Freight (transport)	workday	17	500,00	139,34	8 500	13,93	08-07-22
4081	Packaging	bag	14 000	5,00	1 147,54	70 000	114,75	08-07-21
5380	Water for irrigation, fee	ha	0	10 000,00	0,00	0	0,00	08-07-01
5380	Water for irrigation, pump	l	300	61,50	302,46	18 450	30,25	08-07-01
4066	Harvesting	workday	250	500,00	2 049,18	125 000	204,92	08-07-20
		SEPARATE COSTS 1, TOTAL			9 213,92	562 049	921,39	
0000	Tractor, maintenance	h	1,0	12 000,00	196,72	12 000	19,67	08-08-04
10000	Interest, working capital	€	2 517	7%	2,89	176	0,29	08-08-05
		SEPARATE COSTS 2, TOTAL			9 413,53	574 225	941,35	
0000	Machinery, depreciation + interest	h	1	1 200,00	19,67	1 200	1,97	
20000	Labour	workday	35	500,00	286,89	17 500	28,69	08-08-09
		SEPARATE COSTS 3, TOTAL			9 720,09	592 925	972,01	
	GROSS MARGIN							

30000	GM 1 = INCOMES - SEPARATE COSTS 1	26 064,08	1 589 909	2 606,41	
	GM 2 = INCOMES - SEPARATE COSTS 2	25 864,47	1 577 733	2 586,45	
	GM 3 = INCOMES - SEPARATE COSTS 3	25 557,91	1 559 033	2 555,79	

	EXAMPLES OF COMMON INCOMES	EXAMPLES OF COMMON COSTS	
	Single farm support	Couch grass treatment	
		Liming	
		Management	
		Insurances	
		Other cost for machinery	

Version 08-MK

Cucumber
Price level 2007

Cucumber: Price, According to Annual Statistical Report 2007.

Seeds: The normative for 1ha is 30000 seed units. The average price ranges 5-8 denars/seed unit.(source: agricultural pharmacy, winter 2008).

Fertilization: The normative for 1ha is 400 kg (10 bags of 50 kg) costing between 1300-1400 denars/bag. Additionally, the cucumbers are fertilized in spring with 200kg of nitrate fertilizer (CAN, urea etc), and if dripping irrigation system is used, then around 100l of crystal fertilizer are used.(source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Fungicides: Cost of chemicals, Benfungin 0,1% costing 900 denars; Dakoflo 2,5-3 l costing 1700 denars; Mankogal 80 2,5 kg costing 700 denars; Mankogal 80 0,25% costing 3000 denars; Dakoflo 2,5-3 l costing 1700 denars; Bakarni oksihlorid 50 0,5-0,75% costing 700 denars; Dional 500 SC 0,1-0,2% costing 1000 denars; Akord 0,075% costing 300 denars; Akord 0,075% costing 300 denars; Dakoflo 2,5-3 l costing 1700 denars (source: Hromos-Pesticicdi & Agrimitko, winter spring 2008).

Insecticides: Cost of chemicals, Galition G-5 20-25 kg costing 4000 denars; Dimetogal 0,05-0,1% costing 500 denars; Tonus 0,02-0,025% costing 600 denars; Abastate 0,075% costing 1950 denars;Tonus 0,02-0,025% costing 600 denars; Abastate 0,075% costing 1950 denars; Tonus 0,02-0,025% costing 600 denars; Abastate 0,075% costing 1950 denars (source: Hromos-Pesticicdi & Agrimitko, winter 2008)

Freight (transport): The normative for 140-145 tones yield is 17 workdays costing 500 denars/workday. (source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Packaging: 1 bag is intended for 10kg of product, costing 5 denars/bag.(source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Machinery - maintenance, depreciation and interest:

Machinery depreciation based on the functional depreciation method for tractor IMT 539 29KW.
Machinery maintenance based on lump-sum.

Labour: Labour requirements according to the interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food.

Subsidies: According to NARDS, 2008.

Source: Survey data, 2008

Appendix 3: Enterprise budget calculation for the pepper crop

SLUs

Crop budget **Pepper**

NARDS Subsidy scheme:	Eligible
Other subsidies:	Avaiable
Machinery:	Own
Irrigation:	Dripping
Indicate production scale	family farm

Incomes and separate costs per hectar

Yield, kg/ha 55 000

			Quant	Price	€	Denars	Decares Yield, kg/dc	Decares €	Transactions date
	INCOMES								
3066	Pepper	kg	55 000	31,00	27 950,82	1 705 000	5 500	2 795,08	08-06-12
3078	Subsidies	€	1	50 000	819,67	50 000		81,97	
3078	Other subsidies and grants	€	1	2 000	32,79	2 000		3,28	
		INCOMES, TOTAL			28 803,28	1 757 000		2 880,33	
	SEPARATE COSTS								
4010	Seeds, pepper	nr	60	3 200,00	3 147,54	192 000		314,75	08-01-22
4023	NPK Fertilizer	kg	500	27,00	221,31	13 500		22,13	07-10-05
4023	NPK Fertilizer (second feeding up)	kg	100	27,00	44,26	2 700		4,43	08-04-05

4021	Fertilizer (N)	kg	200	20,00	65,57	4 000		6,56	08-03-24
4020	Other fertilizer for irrigation system	kg	100	150,00	245,90	15 000		24,59	08-04-01
5360	Fuel, tractor (ploughing)	l	20	61,50	20,16	1 230		2,02	07-10-07
5360	Fuel, tractor (ploughing over)	l	20	61,50	20,16	1 230		2,02	07-10-23
5360	Fuel, tractor (disking)	l	15	61,50	15,12	922		1,51	08-03-05
5360	Fuel, tractor (harrowing)	l	15	61,50	15,12	922		1,51	08-03-06
5360	Fuel, tractor (other)	l	15	61,50	15,12	922		1,51	08-01-05
5360	Fuel, tractor (furrowing)	l	10	61,50	10,08	615		1,01	08-03-11
5360	Fuel, tractor (mechanical polination)	l	19	61,50	19,16	1 169		1,92	08-04-02
4061	Soil cultivation, contractor (tractor)	times	0	5 000,00	0,00	0		0,00	08-03-30
4061	Soil cultivation, contractor (cultivator)	times	0	2 500,00	0,00	0		0,00	08-03-30
4042	Fungicides	total	13400	1,00	219,67	13 400		21,97	08-06-08
4043	Insecticides	total	11050	1,00	181,15	11 050		18,12	08-06-08
5700	Freight (transport)	workday	33	500,00	270,49	16 500		27,05	08-06-07
4081	Packaging	bag	9 167	6,00	901,67	55 002		90,17	08-06-06
5380	Water for irrigation, fee	ha	0	10 000,00	0,00	0		0,00	08-05-15
5380	Water for irrigation, pump	l	300	61,50	302,46	18 450		30,25	08-05-15
4066	Harvesting	workday	220	500,00	1 803,28	110 000		180,33	08-06-05
		SEPARATE COSTS 1, TOTAL			7 518,22	458 611		751,82	08-06-13
0000	Tractor, maintenance	h	1,0	12 000,00	196,72	12 000		19,67	08-06-15
10000	Interest, working capital	€	1 549	7%	1,78	109		0,18	08-06-16
		SEPARATE COSTS 2, TOTAL			7 716,72	470 720		771,67	
0000	Machinery, depreciation + interest	h	1	1 200,00	19,67	1 200		1,97	
20000	Labour	workday	25	500,00	204,92	12 500		20,49	08-06-21
		SEPARATE COSTS 3, TOTAL			7 941,31	484 420		794,13	

	GROSS MARGIN				
30000	GM 1 = INCOMES - SEPARATE COSTS 1	21 285,06	1 298 389	2 128,51	
	GM 2 = INCOMES - SEPARATE COSTS 2	21 086,56	1 286 280	2 108,66	
	GM 3 = INCOMES - SEPARATE COSTS 3	20 861,97	1 272 580	2 086,20	

	EXAMPLES OF COMMON INCOMES	EXAMPLES OF COMMON COSTS	
	Single farm support	Couch grass treatment	
		Liming	
		Management	
		Insurances	
		Other cost for machinery	

Version 08-MK

Pepper
Price level 2007

Pepper: Price, According to Annual Statistical Report 2007.

Seeds: The normative for 1ha is 60000 seed units. The average price for Pinocio variety is 3200denars/1000 seed units. (source: agricultural pharmacy, winter 2008).

Fertilization: The normative for 1ha is 200 kg (10 bags of 50 kg) costing between 1300-1400 denars/bag. Additionally, the peppers are fertilized in spring with 200kg of nitrate fertilizer (CAN, urea etc), and if dripping irrigation system is used, then around 100l of crystal fertilizer are used.(source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Fungicides: Cost of chemicals, Benfungin 0,1% costing 900 denars; Dakoflo 2,5-3 l/ha costing 1700 denars; Mankogal 80 2,5 kg/ha costing 700 denars; Mankogal 80 0,25% costing 3000 denars; Dakoflo 2,5-3 l/ha costing 1700 denars; Bakarni oksihlorid 50 0,5-0,75% costing 700 denars; Dional 500 SC 0,1-0,2% costing 1000 denars; Akord 0,075% costing 300 denars; Dional 500 SC 0,1-0,2% costing 1000 denars; Dakoflo 2,5-3 l/ha costing 1700 denars; Bakarni oksihlorid 50 0,5-0,75% costing 700 denars (source: Hromos-Pesticicdi & Agrimitko, winter 2008).

Insecticides: Cost of chemicals, Galition G-5 20-25 kg/ha costing 4000 denars; Dimetogal 0,05-0,1% costing 500 denars; Talstar 10 EC 0,5 l/ha costing 1450 denars; Tonus 0,02-0,025% costing 600 denars; Abastate 0,075% costing 1950 denars; Tonus 0,02-0,025% costing 600 denars; Abastate 0,075% costing 1950 denars (source: Hromos-Pesticicdi & Agrimitko, winter 2008)

Freight (transport): The normative for 55-60 tones yield is 33 workdays costing 500 denars/workday.(source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Packaging: 1 bag is intended for 6kg of product, costing 6 denars/bag.(source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Machinery - maintenance, depreciation and interest:
Machinery depreciation based on the functional depreciation method for tractor IMT 539 29KW.
Machinery maintenance based on lump-sum.

Labour: Labour requirements according to the interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food.

Subsidies: According to NARDS, 2008.

Source: Survey data, 2008

Appendix 4: Enterprise budget calculation for the tomato crop

SLUs
Crop budget **Tomato**

NARDS Subsidy scheme:	Eligible
Other subsidies:	Avaiable
Machinery:	Own
Irrigation:	Dripping
Indicate production scale	family farm

	Incomes and separate costs per hectar		Yield, kg/ha 80 000 Quant	Price	€	Denars	Decares Yield, kg/dc	€	Transactions date
	INCOMES								
3076	Tomato	kg	80 000	18,00	23 607	1 440 027	8 000,00	2 361	08-06-23
3078	Subsidies	€	1	50 000	819,67	50 000		82	
3078	Other subsidies and grants	€	1	2 000	32,79	2 000		3	
		INCOMES, TOTAL			24 459	1 491 999		2 446	
								0	
	SEPARATE COSTS							0	
								0	
4010	Seeds, tomato	nr	40	3 500,00	2 295,08	140 000		230	08-01-25
4023	NPK Fertilizer	kg	500	27,00	221,31	13 500		22	08-04-01
4021	Fertilizer (N)	kg	130	20,00	42,62	2 600		4	08-04-18
4020	Other fertilizer for irrigation system	kg	100	150,00	245,90	15 000		25	07-10-13

5360	Fuel, tractor (ploughing)	l	18	61,50	18,15	1 107		2	07-10-07
5360	Fuel, tractor (ploughing over)	l	18	61,50	18,15	1 107		2	07-10-23
5360	Fuel, tractor (disking)	l	15	61,50	15,12	922		2	08-03-05
5360	Fuel, tractor (harrowing)	l	15	61,50	15,12	922		2	08-03-10
5360	Fuel, tractor (other)	l	15	61,50	15,12	922		2	08-01-05
5360	Fuel, tractor (furrowing)	l	15	61,50	15,12	922		2	08-03-11
5360	Fuel, tractor (mechanical pollination)	l	19	61,50	19,16	1 169		2	08-04-10
4061	Soil cultivation, contractor (tractor)	times	0	5 000,00	0,00	0		0	08-03-30
4061	Soil cultivation, contractor (cultivator)	times	0	2 500,00	0,00	0		0	08-03-30
4042	Fungicides	total	13400	1,00	219,67	13 400		22	08-06-19
4043	Insecticides	total	11050	1,00	181,15	11 050		18	08-06-19
5700	Freight (transport)	workday	17	500,00	139,34	8 500		14	08-06-21
4081	Packaging	crate	8000	20,00	2 622,95	160 000		262	08-06-20
5380	Water for irrigation, fee	ha	0	10 000,00	0,00	0		0	08-05-30
5380	Water for irrigation, pump	l	500	61,50	504,10	30 750		50	08-05-30
4066	Harvesting	workday	177	500,00	1 450,82	88 500		145	08-06-18
		SEPARATE COSTS 1, TOTAL			8 038,88	490 372		804	
0000	Machinery, maintenance	total	1	12 000,00	196,72	12 000	?	20	08-07-02
10000	Interest, working capital	€	1289,236274	7%	1,48	90		0	08-07-03
		SEPARATE COSTS 2, TOTAL			8 237,08	502 462		824	
0000	Machinery, depreciation + interest	h	1	1 200,00	19,67	1 200		2	
20000	Labour	workday	40	500,00	327,87	20 000		33	08-07-01
		SEPARATE COSTS 3, TOTAL			8 584,62	523 662		858	
	GROSS MARGIN								

30000	GM 1 = INCOMES - SEPARATE COSTS 1	16 420,12	1 001 627	1 642	
	GM 2 = INCOMES - SEPARATE COSTS 2	16 221,92	989 537	1 622	
	GM 3 = INCOMES - SEPARATE COSTS 3	15 874,38	968 337	1 587	

	EXAMPLES OF COMMON INCOMES	EXAMPLES OF COMMON COSTS	
	Single farm support	Couch grass treatment	
		Liming	
		Management	
		Insurances	
		Other cost for machinery	

Version 08-MK

Tomato
Price level 2007

Tomato: Price, According to Annual Statistical Report 2007.

Seeds: The normative for 1ha is 40000 seed units. The average price for Tomas variety is 3500denars/1000 seed units. (source: agricultural pharmacy, winter 2008).

Fertilization: The normative for 1ha is 500 kg (10 bags of 50 kg) costing between 1300-1400 denars/bag. Additionally, the tomatoes are fertilized in spring with 200kg of nitrate fertilizer (CAN, urea etc), and if dripping irrigation system is used, then around 100l of crystal fertilizer are used.(source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Fungicides: Cost of chemicals, Benfungin 0,1% costing 900 denars; Dakoflo 2,5-3 l/ha costing 1700 denars; Mankogal 80 2,5 kg/ha costing 700 denars; Mankogal 80 0,25% costing 3000 denars; Dakoflo 2,5-3 l/ha costing 1700 denars; Bakarni oksihlorid 50 0,5-0,75% costing 700 denars; Dional 500 SC 0,1-0,2% costing 1000 denars; Akord 0,075% costing 300 denars; Dional 500 SC 0,1-0,2% costing 1000 denars; Dakoflo 2,5-3 l/ha costing 1700 denars; Bakarni oksihlorid 50 0,5-0,75% costing 700 denars (source: Hromos-Pesticicdi & Agrimitko, winter 2008)

Inseticides: Cost of chemicals, Galition G-5 20-25 kg/ha costing 4000 denars; Dimetogal 0,05-0,1% costing 500 denars; Talstar 10 EC 0,5 l/ha costing 1450 denars; Tonus 0,02-0,025% costing 600 denars; Abastate 0,075% costing 1950 denars; Tonus 0,02-0,025% costing 600 denars; Abastate 0,075% costing 1950 denars (source: Hromos-Pesticicdi & Agrimitko, winter 2008)

Freight (transport): The normative for 80-85 tones yield is 17 workdays costing 500 denars/workday. (source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Packaging: 1 crate is intended for 10kg of product, costing 20 denars/crate.(source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Machinery - maintenance, depreciation and interest:
Machinery depreciation based on the functional depreciation method for tractor IMT 539 29KW.
Machinery maintenance based on lump-sum.

Labour: Labour requirements according to the interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food.

Subsidies: According to NARDS, 2008.

Source: Survey data, 20

Appendix 5: Enterprise budget calculation for the watermelon crop

SLUs

Crop budget **Watermelon**

NARDS Subsidy scheme:	Eligible
Other subsidies:	Avaiable
Machinery:	Own
Irrigation:	Dripping
Indicate production scale	family farm

Incomes and separate costs

per hectar

Yield, kg/ha 40 000

			Quant	Price	€	Denars	Decares Yield, kg/dc	Decares €	Transactions Date
	INCOMES								
3067	Watermelon	kg	40 000	5,00	3 278,69	200 000	4 000	327,87	08-09-01
3078	Subsidies	€	1	50 000	819,67	50 000		81,97	
3078	Other subsidies and grants	€	1	2 000	32,79	2 000		3,28	
	INCOMES, TOTAL				4 131,15	252 000		413,12	
	SEPARATE COSTS								

4010	Seeds, watermelon		kg	1,2	1 875,00	36,89	2 250	3,69	08-04-20
4023	NPK Fertilizer		kg	300	27,00	132,79	8 100	13,28	07-11-20
4021	Fertilizer (N)		kg	150	20,00	49,18	3 000	4,92	08-04-01
4020	Other fertilizer for irrigation system		kg	100	150,00	245,90	15 000	24,59	07-11-15
5360	Fuel, tractor (ploughing)		l	18	61,50	18,15	1 107	1,82	07-11-05
5360	Fuel, tractor (ploughing over)		l	18	61,50	18,15	1 107	1,82	07-11-25
5360	Fuel, tractor (disking)		l	15	61,50	15,12	922	1,51	08-03-01
5360	Fuel, tractor (harrowing)		l	10	61,50	10,08	615	1,01	08-03-05
5360	Fuel, tractor (other)		l	20	61,50	20,16	1 230	2,02	08-03-10
5360	Fuel, tractor (mechanical seeding)		l	12	61,50	12,10	738	1,21	08-03-12
5360	Fuel, tractor (other)		l	48	61,50	48,39	2 952	4,84	08-03-18
4061	Soil cultivation, contractor (tractor)		times	0	5 000,00	0,00	0	0,00	08-03-15
4061	Soil cultivation, contractor (cultivator)		times	0	2 500,00	0,00	0	0,00	08-03-15
4042	Fungicides		total	12000	1,00	196,72	12 000	19,67	08-08-28
4043	Insecticides		total	12150	1,00	199,18	12 150	19,92	08-08-28
5700	Freight (transport)		workday	7	500,00	57,38	3 500	5,74	08-08-31
4081	Packaging			0	0,00	0,00	0	0,00	08-08-30
5380	Water for irrigation, fee		ha	0	8 000,00	0,00	0	0,00	08-08-10
5380	Water for irrigation, pump		l	50	61,50	50,41	3 075	5,04	08-08-10
4066	Harvesting		workday	20	500,00	163,93	10 000	16,39	08-08-30
		SEPARATE COSTS 1, TOTAL				1 274,53	77 746	127,45	
0000	Tractor, maintenance		h	1,0	15 000,00	245,90	15 000	24,59	08-10-02
10000	Interest, working capital		€	388	7%	0,45	27	0,05	08-10-03
		SEPARATE COSTS 2, TOTAL				1 520,88	92 774	152,09	
0000	Tractor, depreciation + interest		h	1	1 200,00	19,67	1 200	1,97	
20000	Labour		workday	15	500,00	122,95	7 500	12,30	08-10-08

	SEPARATE COSTS 3, TOTAL	1 663,50	101 474	166,35	
	GROSS MARGIN				
30000	GM 1 = INCOMES - SEPARATE COSTS 1	2 856,62	174 254	285,66	
	GM 2 = INCOMES - SEPARATE COSTS 2	2 610,27	159 226	261,03	
	GM 3 = INCOMES - SEPARATE COSTS 3	2 467,65	150 527	246,77	

EXAMPLES OF COMMON INCOMES	EXAMPLES OF COMMON COSTS	
Single farm support	Couch grass treatment	
	Liming	
	Management	
	Insurances	
	Other cost for machinery	

Version 08-MK

Watermelon
Price level 2007

Watermelon: Price, According to Annual Statistical Report 2007.

Seeds: The normative for 1ha is 1200g, the average price is 1875denars/kilo (source: Agricultural pharmacy, winter 2008).

Fertilization: The normative for 1ha is 500 kg (10 bags of 50 kg) costing between 1300-1400 denars/bag. Additionally, the watermelons are fertilized in spring with 200kg of nitrate fertilizer (CAN, urea etc), and if dripping irrigation system is used, then around 100l of crystal fertilizer are used. (source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Fungicides: Cost of chemicals, Benfungin 0,1% costing 900 denars; Dakoflo 2,5-3 l costing 1700 denars; Mankogal 80 2,5 kg costing 700 denars; Mankogal 80 0,25% costing 3000 denars; Dakoflo 2,5-3 l costing 1700 denars; Bakarni oksihlorid 50 0,5-0,75% costing 700 denars; Dional 500 SC 0,1-0,2% costing 1000 denars; Akord 0,075% costing 300 denars; Akord 0,075% costing 300 denars; Dakoflo 2,5-3 l costing 1700 denars (source: Hromos-Pesticicdi & Agrimitko, winter 2008)

Insecticides: Cost of chemicals, Galition G-5 20-25 kg costing 4000 denars; Dimetogal 0,05-0,1% costing 500 denars; Tonus 0,02-0,025% costing 600 denars; Abastate 0,075% costing 1950 denars;Tonus 0,02-0,025% costing 600 denars; Abastate 0,075% costing 1950 denars; Tonus 0,02-0,025% costing 600 denars; Abastate 0,075% costing 1950 denars (source: Hromos-Pesticicdi & Agrimitko, winter 2008)

Freight (transport): The normative for 40 tones yield is 7 workdays costing 500 denars/workday. (source: interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food).

Machinery - maintenance, depreciation and interest:
Machinery depreciation based on the functional depreciation method for tractor IMT 539 29KW.
Machinery maintenance based on lump-sum.

Labour: Labour requirements according to the interview with Prof. Danail Jankuloski, Faculty of agricultural sciences and food.

Subsidies: According to NARDS, 2008.

Source: Survey data, 2008

Appendix 6: Different operations per month for every crop

Crops\Month	January	February	March	April	May	June	July	August	September	October	November	December
Tomatto	*seeding; soil cultivitation*		*soil cultivation*	*fertilization; soil cultivation*	*irrigation*	*insecticides; fungicides; harvesting; packaging*				*fertilization, soil cultivation*		
Cucumber	*seedings; soil cultivitation*		*soil cultivation*	*fertilization; soil cultivation*	*soil cultivation*		*insecticides; fungicides; harvesting; packaging*			*soil cultivation*		
Cabage					*seeding*		*fertilization; soil cultivation*		*insecticides; fungicides, harvesting, packaging, irrigation*			
Pepper	*seedings; soil cultivitation*		*fertilization; soil cultivation*	*fertilization; soil cultivation*	*irrigation*	*insecticides; fungicides; harvesting; packaging*				*fertilization, soil cultivation*		
Watermalon			*soil cultivation*	*seeding; fertilization*				*insecticides; fungicides; harvesting; packaging*			*fertilization, soil cultivation*	

Source: Survey data, 2008

Appendix 7: Time availability of fresh vegetable products in the Republic of Macedonia

Product	January	February	March	Aprir	May	June	July	August	September	Octomber	Novevmber	December
Tomato												
Pepper												
Cabbage												
Watermelon												
Cucumber												

Source: Horticulture marketing study in the Republic of Macedonia, 2000

Appendix 8: Number of days for every operation before the yield for the tomato crop

Number of days before yield	October	January	February	March	April	May	June
Seeds, tomato		150					
NPK Fertilizer					83		
Fertilizer (N)					66		
Other fertilizer for irrigation system	254						
Fuel, tractor (ploughing)	260						
Fuel, tractor (ploughing over)	244						
Fuel, tractor (disking)				110			
Fuel, tractor (harrowing)				105			
Fuel, tractor (other)		170					
Fuel, tractor (furrowing)				104			
Fuel, tractor (mechanical pollination)					74		
Soil cultivation, contractor (tractor)				85			
Soil cultivation, contractor (cultivator)				85			
Fungicides							4
Insecticides							4
Freight (transport)							2
Packaging							3
Water for irrigation, fee						24	
Water for irrigation, pump						24	
Harvesting							5

Source: Survey data, 2008

Appendix 9: Number of days for every operation before the yield for the cucumber crop

Number of days before yield	October	January	February	March	April	July
Seeds, cucumber		193				
NPK Fertilizer					124	
Fertilizer (N)					107	
Other fertilizer					105	
Other fertilizer for irrigation system	296					
Fuel, tractor (ploughing)	303					
Fuel, tractor (ploughing over)	285					
Fuel, tractor (disking)				151		
Fuel, tractor (harrowing)				146		
Fuel, tractor (other)		213				
Fuel, tractor (furrowing)					117	
Fuel, tractor (mechanical pollination)					120	
Soil cultivation, contractor (tractor)				126		
Soil cultivation, contractor (cultivator)				126		
Fungicides						5
Insecticides						5
Freight (transport)						12
Packaging						13
Water for irrigation, fee						33
Water for irrigation, pump						33
Harvesting						14

Source: Survey data, 2008

Appendix 10: Number of days for every operation before the yield for the watermelon crop

Number of days before yield	November	March	April	May	June	July	August
Seeds, watermelon			134				
NPK Fertilizer	286						
Fertilizer (N)			153				
Other fertilizer for irrigation system	291						
Fuel, tractor (ploughing)	301						
Fuel, tractor (ploughing over)	281						
Fuel, tractor (disking)		184					
Fuel, tractor (harrowing)		180					
Fuel, tractor (other)		175					
Fuel, tractor (mechanical seeding)		173					
Fuel, tractor (other)		167					
Soil cultivation, contractor (tractor)		170					
Soil cultivation, contractor (cultivator)		170					
Fungicides							4
Insecticides							4
Freight (transport)							1
Packaging							2
Water for irrigation, fee							22
Water for irrigation, pump							22
Harvesting							2

Source: Survey data, 2008

Appendix 11: Number of days for every operation before the yield for the pepper crop

Number of days before yield	October	January	February	March	April	May	June
Seeds, pepper		142					
NPK Fertilizer	251						
NPK Fertilizer (second feeding up)					68		
Fertilizer (N)				80			
Other fertilizer for irrigation system					72		
Fuel, tractor (ploughing)	249						
Fuel, tractor (ploughing over)	233						
Fuel, tractor (disking)				99			
Fuel, tractor (harrowing)				98			
Fuel, tractor (other)		159					
Fuel, tractor (furrowing)				93			
Fuel, tractor (mechanical polination)					71		
Soil cultivation, contractor (tractor)				74			
Soil cultivation, contractor (cultivator)				74			
Fungicides							4
Insecticides							4
Freight (transport)							5
Packaging							6
Water for irrigation, fee						28	
Water for irrigation, pump						28	
Harvesting							7

Source: Survey data, 2008

Appendix 12: Number of days for every operation before the yield for the cabbage crop

Number of days before yield	March	April	May	June	September
Seeds, cabbage			135		
NPK Fertilizer				88	
Fertilizer (N)				84	
Other fertilizer for irrigation system				79	
for irrigation system				81	
Fuel, tractor (ploughing)				88	
Fuel, tractor (ploughing over)				77	
Fuel, tractor (disking)				74	
Fuel, tractor (harrowing)				71	
Fuel, tractor (other)				73	
Fuel, tractor (mechanical polination)				70	
Fuel, tractor (mechanical seeding)				74	
Soil cultivation, contractor (tractor)				69	
Soil cultivation, contractor (cultivator)				69	
Fungicides					9
Insecticides					9
Freight (transport)					5
Packaging					6
Water for irrigation, fee					14
Water for irrigation, pump					14
Harvesting					7

Source: Survey data, 2008

Appendix 13: The profit and loss statement of the experienced farmer

Profit and loss statement

Income			**%**
3066	Pepper	5 901,64 €	62%
3067	Watermelon	491,80 €	5%
3074	Cabbage	819,67 €	9%
3076	Tomato	2 360,66 €	25%
Total income		9 573,77 €	100%
Costs			
4010	Seeds	850,82 €	17%
4020	Fertilizers	410,66 €	8%
4021	N	80,33 €	2%
4023	NPK	157,13 €	3%
4042	Fungicides	94,72 €	2%
4043	Pesticides	99,44 €	2%
4066	Harvesting	657,70 €	13%
4081	Packaging	698,36 €	14%
5170	Repair/maintenance of buildings	56,00 €	1%
5310	Electricity	146,00 €	3%
5360	Fuel, oil	87,06 €	2%
5380	Water	168,87 €	3%
5520	Repair/maintenance of movables	878,00 €	17%
5700	Freight	279,67 €	6%
6900	Sundry	300,00 €	6%
7010	Wages	117,00 €	2%
Total costs		5 081,77 €	100%
Income before depreciation		4 492,00 €	53%
Depreciation (yearly reinvestment and amortisation requirements)			
7810	Depreciations, intangible assets	0,00 €	0%
7814	Depreciations, production rights	0,00 €	0%
7821	Depreciations, buildings	320,00 €	11%
7832	Depreciations, machinery/inventory	2 633,00 €	89%
7833	Depreciations, building fittings	0,00 €	0%
7835	Depreciations, land improvements	0,00 €	0%
Total depreciation (yearly reinvestment and amortisation requirements)		2 953,00 €	100%
Income after depreciation		1 539,00 €	66%
Financial income and costs			
8310	Interest earned, liquid assets	0,00 €	
8410	Interest paid, long term debts	-0,00 €	
Total financial incomes and costs		0,00 €	
Income from capital and earned income		1 539,00 €	100%

Source: Survey data, 2008

Appendix 14: The profit and loss statement of the family farmer

Profit and loss statement

Income		Value	%
3066	Pepper	5 163,93 €	84%
3076	Tomato	983,61 €	16%
Total income		6 147,54 €	100%
Costs			
4010	Seeds	259,02 €	12%
4020	Fertilizers	36,89 €	2%
4021	N	204,92 €	10%
4023	NPK	39,84 €	2%
4042	Fungicides	36,89 €	2%
4043	Pesticides	36,89 €	2%
4066	Harvesting	252,87 €	12%
4081	Packaging	167,87 €	8%
5170	Repair/maintenance of buildings	53,00 €	3%
5310	Electricity	50,00 €	2%
5360	Fuel, oil	222,94 €	11%
5380	Water	55,45 €	3%
5520	Repair/maintenance of movables	153,00 €	7%
5700	Freight	199,18 €	9%
6900	Sundry	300,00 €	14%
7010	Wages	40,00 €	2%
Total costs		2 108,73 €	100%
Income before depreciation		4 038,81 €	34%
Depreciation (yearly reinvestment and amortisation requirements)			
7810	Depreciations, intangible assets	0,00 €	0%
7814	Depreciations, production rights	0,00 €	0%
7821	Depreciations, buildings	160,00 €	26%
7832	Depreciations, machinery/inventory	458,00 €	74%
7833	Depreciations, building fittings	0,00 €	0%
7835	Depreciations, land improvements	0,00 €	0%
Total depreciation (yearly reinvestment and amortisation requirements)		618,00 €	100%
Income after depreciation		3 420,81 €	15%
Financial income and costs			
8310	Interest earned, liquid assets	0,00 €	
8410	Interest paid, long term debts	-0,00 €	
Total financial incomes and costs		0,00 €	
Income from capital and earned income		3 420,81 €	100%

Source: Survey data, 2008

Appendix 15: The profit and loss statement of the registered farmer

Profit and loss statement

Income			**%**
3076	Tomato	9 836,07 €	84%
3077	Cucumber	1 901,64 €	16%
			0%
Total income		11 737,70 €	100%
Costs			
4010	Seeds	606,56 €	16%
4020	Fertilizers	192,62 €	5%
4021	N	36,07 €	1%
4023	NPK	53,11 €	1%
4042	Fungicides	143,44 €	4%
4043	Pesticides	204,92 €	5%
4066	Harvesting	392,62 €	10%
4081	Packaging	775,57 €	20%
5170	Repair/maintenance of buildings	14,00 €	0%
5310	Electricity	300,00 €	8%
5360	Fuel, oil	278,23 €	7%
5380	Water	115,94 €	3%
5520	Repair/maintenance of movables	178,00 €	5%
5700	Freight	34,84 €	1%
6900	Sundry	500,00 €	13%
7010	Wages	56,00 €	1%
			0%
Total costs		3 881,93 €	100%
Income before depreciation		7 855,78 €	33%
Depreciation (yearly reinvestment and amortisation requirements)			
7810	Depreciations, intangible assets	0,00 €	0%
7814	Depreciations, production rights	0,00 €	0%
7821	Depreciations, buildings	80,00 €	13%
7832	Depreciations, machinery/inventory	533,00 €	87%
7833	Depreciations, building fittings	0,00 €	0%
7835	Depreciations, land improvements	0,00 €	0%
Total depreciation (yearly reinvestment and amortisation requirements)		613,00 €	100%
Income after depreciation		7 242,78 €	8%
Financial income and costs			
8310	Interest earned, liquid assets	0,00 €	
8410	Interest paid, long term debts	-0,00 €	
Total financial incomes and costs		0,00 €	
Income from capital and earned income		7 242,78 €	100%

Source: Survey data, 2008

Appendix 16: The profit and loss statement of the young farmer

Profit and loss statement

Income			**%**
3074	Cabbage	360,66 €	38%
3076	Tomato	590,16 €	62%
Total income		950,82 €	100%
Costs			
4010	Seeds	6,05 €	1%
4020	Fertilizers	65,57 €	11%
4021	N	7,87 €	1%
4023	NPK	11,07 €	2%
4042	Fungicides	9,84 €	2%
4043	Pesticides	14,75 €	3%
4066	Harvesting	68,11 €	12%
4081	Packaging	101,23 €	18%
5170	Repair/maintenance of buildings	11,00 €	2%
5360	Fuel, oil	92,50 €	16%
5380	Water	13,11 €	2%
5520	Repair/maintenance of movables	63,00 €	11%
5700	Freight	18,93 €	3%
6900	Sundry	80,00 €	14%
7010	Wages	8,00 €	1%
			0%
Total costs		571,04 €	100%
Income before depreciation		379,78 €	60%
Depreciation (yearly reinvestment and amortisation requirements)			
7810	Depreciations, intangible assets	0,00 €	0%
7814	Depreciations, production rights	0,00 €	0%
7821	Depreciations, buildings	60,00 €	24%
7832	Depreciations, machinery/inventory	188,00 €	76%
7833	Depreciations, building fittings	0,00 €	0%
7835	Depreciations, land improvements	0,00 €	0%
Total depreciation (yearly reinvestment and amortisation requirements)		248,00 €	100%
Income after depreciation		131,78 €	65%
Financial income and costs			
8310	Interest earned, liquid assets	0,00 €	
8410	Interest paid, long term debts	-0,00 €	
Total financial incomes and costs		0,00 €	
Income from capital and earned income		131,78 €	100%

Pris: 100:- (exkl moms)

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