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# I. Orodja za podporo poslovnemu odločanju

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## **AGRIWISE MACEDONIA - A NEW DECISION SUPPORT SYSTEM FOR FARM MANAGEMENT IN CONTRAST TO CURRENT PRACTICES**

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### **ABSTRACT**

The objective of this paper is to test a new model for farm business management, as a tool for farm management planning for extension and advisory application, and compare it to current practices in Macedonia. The model used is the Farm Business Plan Agriwise, developed by the Swedish Agricultural University (SLU) and adjusted to Macedonian conditions. The plan represents a basis for appraisal of the profitability, capital return and financing from different operating alternatives. Besides exploiting the business plan as an internal tool for self-evaluation and strategic planning, it also functions as a material for external presentation. The proposed decision support system brings data from different disciplines together to an entirety needed in farm business planning. In this context, relevant experiences from the literature are reviewed. The research method includes cases where advisors compare the case farm advisory situation, based on current methods in contrast to an application of the new Agriwise model. The advisors' conceptions are then summarized in terms of advantages and disadvantages rising from the use of this model for the farm's investment and production structure decisions. The expected outcome is to obtain an assessment of the new model by advisors as well as a foundation for further adaptation of the model to Macedonian conditions and use in the advisor-farmer cooperation.

*Key words: farm business management, decision support system, strategic planning, advisory role*

## **AGRIWISE MACEDONIA - NOV SISTEM ZA POMOČ PRI POSLOVNEM ODLOČANJU V KMETIJSTVU V PRIMERJAVI S SEDANJO PRAKSO**

### **IZVLEČEK**

Namen prispevka je testiranje novega modela za upravljanje kmetijskih gospodarstev, ki bi ga kot orodje za načrtovanje gospodarjenja uporabljali pri svetovanju, in primerjava tega s sedanjo prakso v Makedoniji. Uporabljen je model

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Poslovni načrt kmetije Agriwise, ki ga je razvila Švedska kmetijska univerza, prilagojen pa je pogojem v Makedoniji. Načrt predstavlja osnovo za oceno dobičkonosnosti, donosa kapitala in denarnega toka za različne alternative. Poleg uporabnosti poslovnega načrta kot orodja za interno programiranje in strateško načrtovanje lahko služi tudi kot pripomoček za predstavitev poslovnih zamisli zunanjim akterjem. Predlagan sistem za podporo odločanju združuje podatke različnih področij v celoto, ki je potrebna pri načrtovanju gospodarjenja na kmetijah. Prikazani so primeri svetovanja, ki temeljijo na dosedanjih metodah, v primerjavi z uporabo novega modela Agriwise. Razumevanje s strani svetovalcev je povzeto v obliki prednosti in pomanjkljivosti, ki izhajajo iz uporabe novega modela pri odločitvah s področja naložb in proizvodne strukture na kmetijah. Pričakovan rezultat je pridobitev ocene o modelu s strani svetovalcev, izhodišč za nadaljnjo prilagoditev modela pogojem v Makedoniji in njegovi uporabi v sodelovanju med kmetom in svetovalcem.

*Ključne besede: kmetijsko obratoslovje, sistem za podporo odločanju, strateško načrtovanje, vloga svetovanja*

## 1 Introduction

Farm business planning is rarely executed as a regular, structured activity on farms in Macedonia. Private family farmers are not obliged to keep farm books or conduct farm accounting, hence, they very often lack valuable information derived from farm records which can indicate the profitability, support the decision-making process and facilitate the farm business planning. Successful farming requires effective methods for executing and monitoring plans, both on strategic and operational level (Miller, Boehlje, Dobbins, 1998).

In the past transition period, the Macedonian farmer faced change of the traditional markets, unstable prices, unpredictable demand and inconsistent sources of supply. Macedonian farms are small and heterogenic; data from the Agricultural Census in 2007 indicate 192 thousand agricultural holdings, which cultivate 264 thousand ha. According to this source, the average farm utilizes agricultural area of as low as 1.37 ha (SSO, 2008). Moreover, the farmers are not organized and have little bargaining power. Prices of inputs have risen since 2008, causing a farm income squeeze. In such conditions, the role of the farmer as a business manager is critical since maintaining the farm profitability becomes the key strategy (McBride and Johnson, 2004).

Miller, Boehlje and Dobbins (1998) reason that it is not only important that the farmer produces efficiently, achieving high levels of output at lower than the average production costs (»doing things right«). They argue that strategic planning is becoming increasingly important, in terms of strategic decisions such as farm product mix, market linkages, financial structure, and relationships with input suppliers and product buyers. In this theory, not only the farmer has to be efficient, but he/she also needs to consider the right strategic choices (»doing the right thing«).

Information available on farm management promotes tasks such as objective setting, planning, decision making, monitoring and control to achieve farm business success (Turner and Taylor, 1998). In this context, the farm business plan is

designed as an instrument for assessment of the agricultural holding that can support creation of a clear image of all aspects of the farming operations. The plan represents a basis for appraisal of the profitability, financing and usage of the capital returns and profit from different operating alternatives. Besides its use as an internal tool for evaluation and strategic planning, the business plan also functions as a material for external presentation, and for instance can be used for loan or grant application.

The Department of Economics at SLU has developed a decision support system for farm business planning, Agriwise, which is widely used in Sweden. The objective of this paper is to test this model applicability for farm business management in Macedonia and compare it to current practices.

The paper starts with an overview of the Agriwise model, along with a review of the available methods used and the adjustments made to Macedonian conditions. In this context, relevant experiences from the literature are reviewed. The cases where advisors compare the case farm advisory situation, based on current methods in contrast to an application of the new Agriwise model are then summarized. The main conclusions are drawn in the end.

## **2 Materials and methods used**

The model used is the Farm Business Plan Agriwise, developed by the Swedish Agricultural University (SLU) and adjusted to Macedonian conditions, as a tool for farm management planning for extension and advisory application.

The research method includes cases where advisors compare the case farm advisory situation, based on current methods in contrast to an application of the new Agriwise model. The current business and farm management advice provided by the advisors is based on data from the Farm Monitoring System of the National Extension Agency (FMS of NEA). The advisors' conceptions are summarized in terms of advantages and disadvantages rising from the use of this model for the farm's investment and production structure decisions.

The perceptions held by the likely users and transferees of Agriwise - the extension agents - were gathered through interviews that were semi-structured in nature, using a list of questions. The cases were drawn from their working knowledge and experience in the facilitation of farm and business management advises.

The questionnaire basically covers the following areas: the current farm management business planning practices; the usual response of advisors and farmers to such practices, the room for improvement of current practices. Furthermore, advisors were asked if the Agriwise Macedonia model meets their needs and provides added value to their services. Particular attention was paid to the standard budgets and the advisors were asked to determine their effectiveness. Finally, the advisors were inquired whether they think the current data from the farmer (eg. Farm Monitoring System - FMS) can be used for Agriwise Macedonia and what purpose the model would most likely serve for according to their opinion.

### 3 Theory and model: Agriwise as a decision support system for farm management

A decision support system, by definition, supports business and organizational decision-making activities, usually as an interactive software-based system intended to help decision makers compile useful information from a combination of raw data, documents, personal knowledge, or business models to identify and solve problems and make decisions (Keen, 1978).

Agriwise is a farm business plan model intended to serve as a decision support system for farm management. The model can be used with newly founded businesses and investment businesses, as well as when performing an analysis of a certain company. This is a flexible program which is suitable for different users. Either one simple profitability calculation can be done, where the necessary data are filled in manually and the previously entered data are used; or a more detailed operating plan can also be made, where an additional calculation of the production branch, calculation of the result, balance calculation and feed balance are used and can be adjusted according to a certain situation (Öhlmér *et al.*, 2000). Among others, potential users are extension agents, company owners with the purpose of planning, creditors, academic staff etc.

The model contains enterprise budgets for the most common crops and animal production lines as well as a computer program for farm business planning. Enterprise budgets are compiled based on data collected from producers, but were also revised by a panel for the specific enterprise, comprising of technology experts and extension agents. In addition, a database with data needed in farm business planning is included. The decision support system is an example of how data from many different disciplines are brought together to an entirety needed in farm business planning. The goal is that the program represents an easily usable and adjustable aid for whoever wishes to establish a plan on working with agriculture (Öhlmér *et al.*, 2000).

Turner and Taylor (1998) recommend the gross margin principle in contrast to full cost accounting because it is relatively easy to allocate the separate enterprise costs to each enterprise but difficult to distribute the joint costs, such as fixed costs and over-head costs, therefore a good planning system should use gross margin calculation and add the joint costs separately without dividing them on each enterprise.

Consequently the model contains three different levels of separate costs in the enterprise budgets:

- Separate costs 1 - seeds, fertiliser, plant protection, land cultivation, irrigation, packaging, transport
- Separate costs 2 - separate cost 1 + machinery maintenance and interest of working capital
- Separate costs 3 - separate costs 2 + depreciation + interest of direct machinery, direct labour not included in separate costs 1

Three levels of the gross margin (gross margin 1, 2 and 3) are calculated as the sum of the enterprise income minus the sum of the respective separate costs.

Turner and Taylor (1998) also point out that there are three indicators of the viability of a business: profitability, feasibility (cash flow) and worthwhileness (return

on capital). To reach profitability, income must exceed expenditure including depreciation, tax and personal drawings, so a planning system must estimate this. Feasibility can partly be estimated by estimating financial costs and include the financing of planned investments including what is needed to cover the lower profitability the first years (growth costs). Then the simple approach of calculating a one-year budget can be used. The feasibility could be further investigated with a one-year budget model by estimating a budget for both the first year and an average year. Worthwhileness can also be calculated by estimating the return on capital of the average year.

The Agriwise model is principally structured of the following segments: (1) main model, (2) report, (3) support model.

The main model is compilation of the whole farm income and costs, while the report is consisting of calculated results, balances and ratios. The support model aims at assisting the estimate of specific data; example of support model is the feed balance, internal prices, calculation factors, maintenance and depreciation costs, solvency, salary and possible debts. The opening data page enlists the farm business plan headings.

The operating plan is usually structured in the following order: selection of farm enterprises, production capacity, feed balances, internal prices (on-farm), income inflow, wages and working hours, assets values, maintenance and depreciation rates, operating expenses not include in enterprise budgets and investment-financial plan. The feed balance indicates the balance between the farm feed demand and own feed supply. The permanent assets folder regards the annual maintenance and depreciation requirements concerning farm buildings, land improvements, farm infrastructure, permanent crops and machinery.

The profit and loss is then calculated:

- + Total Income
- Total Costs
- Depreciation
- + Financial income
- Financial costs
- = Income from capital and earned income

Certain adjustments were performed on the Farm Business Planning model originally developed at SLU in order to adapt it to Macedonian conditions. Most of them concern the farm enterprise budgets and the structure of the budget sheet.

The adjusted model was tested with an example – a dairy cows enterprise for the following production scales: small family farm (10 dairy cows) and large agricultural company farm (300 dairy cows), as discussed in a paper by Martinovska-Stojceska, Dimitrievski, Öhlmér and Karlsson (2009).

Additionally, best practice model crop enterprise budgets were prepared for silage maize, alfalfa, wheat, barley, tomato, pepper, cucumber, cabbage, watermelon, apple and grapes, based on current technology applied in Macedonia. The crop budgets offer options for the following parameters: production scale (family farm/agricultural company), machinery (own/rented), irrigation (rain fed/irrigated) and subsidy scheme (eligible/non-eligible).

Agriwise Macedonia model contains an added feature of sensitivity analysis of inputs used (on whole farm level), and sensitivity of the gross margin, break-even price and break-even yields at separate costs 1.

## 4 Results and discussion: Current practices in contrast to Agriwise

The literature review along with the empirical experience made clear that it is necessary to develop a better understanding of the current practices of farm business management planning and the decision making systems presently used, and compare them with the farm management potential of Agriwise.

The findings of current methods in contrast to an application of the new Agriwise model are summarized in terms of advantages and disadvantages as follows:

FMS farm report	Agriwise farm report
Simple layout, understandable to farmers Provides overview of their production and business results in the previous period Provides comparison with the average performances Suitable for operational planning Can serve as background material for business plan Suitable for small farms	Added value (as to FMS reports) Model fulfils the user needs-perspective Presents full farm business plan Suitable for investment and production structure decisions Suitable for strategic planning Can be presented to financing institutions Promotes benchmarking Suitable for commercially oriented farms
Represents only actual raw data, not a complete farm business plan Only current situation, no alternatives provided	Takes time Advisors need training and education Farmer cannot use the tool independently More complicated to understand

The investigation of the current farm management business planning practices proved that farm management, especially with regard to the business analysis and planning, has not been a priority of the extension service in Macedonia. The Farm Monitoring System (FMS)<sup>1</sup> is a tool currently used by advisors. The FMS contains basic farm data with regard to the farm resources, income and costs. Annual reports are produced within this system and advisors can use this format to provide an analysis of the actual farm results, mainly focusing on gross margin level. Crop and livestock enterprises can be compared on farm level. Recently, average crop budgets are extracted from the FMS, thus providing performance orientation.

<sup>1</sup> The Farm Monitoring System (FMS) was established in 2001 and is hosted by the National Extension Agency (NEA). NEA advisors carry out the collection of farm income and costs data of around 400 family farms throughout the country on annual basis. The FMS data collection network is organised through 6 regional and around 30 local NEA units with approximately 60 advisors engaged in the process.

The NEA advisors are typically collecting/recording the farm data themselves; while farm record keeping is common at the commercial farms (agricultural enterprises) since they are due to submit accounting reports on annual basis, it is hardly ever present at small-scale farms.

Farm business planning has so far been out of focus, having the business plan as tool predominantly used for loan application on Macedonian farms. It is noteworthy to mention that farm crediting through the IFAD 1 and 2 frameworks covered approximately 3,500 loans, used by nearly 2,600 applicants, which in relative terms means that only around 1.46% of the total farms in the country prepared loan application business plan in the past decade (MAFWE, 2007).

Advisors recognize that there is room for improvement of current practices, and the need to use planning for both tactical, short-term and strategic, long-term perspectives. FMS can be used as starting point for farm performance data. Advisors perceived Agriwise Macedonia model as a sophisticated tool that can provide added value to their services. Technology advices have long been the core of the extension output, but recently farmers start recognizing the need for farm business management and planning advice. However, it is important to stress that providing information, has also become the key part of the extension activity, especially with regard to agricultural policy and national agriculture and rural development support programs. Sources such as Klair, Boggia and Richardson (1998) state that the primary information needs of the farmers are concerning farm management, risk management, EU programs and measures, quality production, low input and organic farming, marketing management, new technology introduction, structural adjustment funds management, investment decisions and rural tourism. The farmer cannot follow the changes in policy, technology and information needs without support (ibid).

Particular attention was paid to the standard budget feature and the advisors were asked to determine their effectiveness. The FMS currently produces enterprise budgets based on actual farm occurrences (positive method), while Agriwise provides planning budgets based on normative method as it describes the best practice or how the activity should be done (Öhlmér *et al.*, 2000). This was perceived as particularly important in case of start-up farms.

Finally, the advisors concluded that the current data from the farmer can be used for the Agriwise Macedonia, but mostly in cases of detailed investment program preparation, strategic planning of important alternatives or in case of assessing the value of the farm and its assets. They believed that the current practices are sufficient for operational decisions, while the Agriwise is suitable for strategic decision-making. Advisors pointed out that Agriwise meets the needs of the farmer, but cannot be used by farmers independently and that the advisors initially need training and support by faculty staff.

## 5 Conclusions

Business planning concentrates on finding the farm's competitive advantage and a successful one should not be a one-time effort, but should evolve as a continuous process of assessing business strengths and weaknesses and assessing opportunities (Miller, Boehlje, Dobbins, 1998).

The results from this paper provided ground for assessment of the new farm management and business planning model by advisors, and gave foundation for further adaptation of the model to Macedonian conditions and use in the advisor-farmer cooperation.

Agriwise Macedonian was perceived as a generally useful tool that enables elaborate analysis of the farm business and ground for farm management planning. Computerized management tools as such are expectedly slowly adopted by farmers since they produce analytical information, whereas farmers use to a great extent intuitive thinking and intuition for decision making (Öhlmér, 2007). The adoption experience suggests that the output information from on-farm computer systems should be further processed to fit intuitive thinking and this is where the role of the advisor can be stressed, as mediator between the farm decision support computer-based system and the farmer (ibid).

Farm size and generally low level of commercialization affect the strategic planning practices in the country. This model is mostly relevant for use at larger, commercially oriented farms or agricultural enterprises. At the present conditions of Macedonian small-scale farmers, where most of them do not perform record keeping and practice semi-subsistence farming, the full model as tool for whole-farm business planning has been found to be over elaborated. However, the enterprise budgets from Agriwise were assessed as a very valuable source tool for providing measures of performance and can be used for benchmarking purposes, at small-scale farms in addition to their use at large-scale farms.

We have to stress that a decision making system like this must be continuously updated, especially in terms of the enterprise budgets, where suggestions from the advisor, such as regional differentiation of the farm enterprise activities, should be seriously considered.

This effort also emphasizes the role of faculty in developing decisions support systems, aimed for farm advisors to support farmers. In this context, it is recommended to set up a steering body consisting of faculty members (as Agriwise coordinators), advisors (as model users and transferees), technological experts (as available technology counselors) and farmers (as end-users). This group can draw suggestions how to improve the model and update the system based on direct feedback from the involved stakeholders.

Finally, the key participants in the whole process – the advisors and the farmers need more education to accept and believe in farm management decision support tools. A farm management model as Agriwise is designed to meet the needs of advisors, which basically decide whether the model is used, and farmers, which decide upon the ultimate usefulness of the model. Therefore, provided that the research so far confirmed the importance of farm management business planning with decision support systems such as Agriwise, the future efforts should concentrate on permanent improvement of this tool, hence avoiding making business plans that never leave the desk.

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