

REVIEW

on a PhD thesis for obtaining the educational and scientific degree "Doctor" in the Higher education field: 3. Social, economic and legal sciences, Professional field: 3.8. Economics, Scientific specialisation: "Economics and Management (Agriculture)"

Author of the PhD thesis: *Dobri Mateev Dunchev*

PhD student (on a regular study) in the department of „Economics” of Agricultural University - Plovdiv

Topic of the PhD thesis: *“Evaluation of Innovation Technologies in Precision Agriculture “*

Reviewer: Assoc. Prof. Dr. Mariya Marinova Peneva, Department of Natural Resources Economics, UNWE, Sofia, 3. Social, Economic and Legal Sciences, 3.8. Economics, "Economics and Management (Agricultural Economics and Policy)", appointed as a member of the scientific jury, order № ПД-16-546 / 25.06.2020 of the Rector of AU.

1. Brief introduction of the PhD candidate.

Dobri Dunchev graduated the Agricultural University of Plovdiv with a Bachelor degree in specialty of "Ecology and Environmental Protection" and Master degrees in specialties of "Ecology of urban systems" and "Accounting and Control". Since 2017 he is a full-time PhD student at the Department of Economics at the same university in the scientific specialty of "Economics and Management (Agriculture)". Since 2004 he works at the company Haygrove LTD (UK) and currently is in the position of manager of planning and recruitment. The attached references for the educational and scientific activity of the PhD student (participation in scientific projects and scientific forums) emphasize his dedication to the research and constant willingness for improvement and further extension of his knowledge and experience in the field of agricultural economics and management.

2. Excellence and novelty.

In the dissertation submitted for review, is considered an undoubtedly important and complex problem, and the PhD student clearly formulates and argues his position. The topic of the study is important and it requires a different, complex approach where a specific consideration is given to the individual case (case study approached is applied) in order to cover all the issues and problems relevant to the introduction of innovative production systems in agriculture meeting societal expectations: on the one hand to increase the productivity of natural resources, respectively the production (supply) of agricultural and food products and on the other hand to preserve and even improve the natural resources condition, the environment and public welfare as general. The topic is important introducing the need and possibilities

to implement precision farming as an "innovative, technological and information-based, intelligent approach for identifying, analysing and managing input variables to ensure cost-effective production with optimal structure and conservation of resources". The approach to a greater extent allows to take into account the capacity of natural resources usage as well as the ambition of our society to achieve higher economic and ecological benefits from agricultural practices at the same time. Today, the agriculture is not just about food production, it is part of the socio-economic and environmental system that should provide the corresponding benefits through the sustainable management and protection of natural resources and biodiversity. The PhD student also emphasises one of the main driving forces for the development of precision farming - the introduction and use of different technological solutions, geographic information systems, optimization models in production investments, electronic systems etc. Therefore, in my point of view the PhD student faced and performed the complex task of developing and implementing an approach that reflects both the specificities of economics and ecology and which approach allowed him to suggest long-term solutions for the precision farming implementation as part of the sustainable agricultural development having in mind the limited resources and growing consumers demand for food, raw materials and energy. The choice of the topic is convincing, relevant and meaningful, as well as the methodological approach. This particular study has its worthy place compared to other similar studies and it sets the framework in which major contributions from a scientific and practical point of view could be defined. Moreover, the topic is relevant and valid not only for our country, but also for European and world trends, for which the doctoral student has successfully presented examples from Europe (United Kingdom) and the world.

3. Goals, research questions/tasks, hypotheses and research methods.

The reviewed PhD thesis is written in 218 standard pages, main text including a reference list. The dissertation contains also 54 figures and 22 tables. The reference list comprises 331 different sources (scientific articles and reports, books, strategic documents, etc.), 17 of which are written in Cyrillic, 294 are in a foreign language (English) and 20 of them present Internet publications. All of them are cited correctly.

The PhD thesis has the standard structure for such a scientific study consisting of an introduction, three chapters and a conclusion and recommendations part. The main text is well written, at high scientific level, balanced and structured by chapters.

The title of the PhD thesis is formulated correctly, and the content corresponds to it. The set goal "to analyze the technical and economic efficiency of innovative technologies in agriculture, based on which to assess the possibility of their implementation in Bulgaria with sector-specific production and institutional conditions" is formulated correctly and it covers the thesis topic as well as it is logically consistent with the hypothesis that: "the introduction of innovations helps to increase technical and overall economic efficiency." I consider that the research questions formulated under different scientific tasks, are well achieved and support the goal, follow the logic and consistency of the text and lead to the realization of the goal and the acceptance of the set research hypothesis. The object and the subject of the research are correctly formulated and in accordance with the goal and the research.

The PhD student has applied appropriate methods for analyses and evaluation of the effectiveness of the innovative solutions implementation in the production of soft fruits, following the "case study" approach, which is appropriate to take into account the specific characteristics of the object of study.

4. Visualization and presentation of the results.

The PhD student has used a wide range of tools to illustrate and summarize the literature and collected data using tables, diagrams and graphs. It is useful and he correctly systematized and objectively presented the results.

5. Discussion of the results and used literature.

The aim and the research questions have been successfully fulfilled and answered in the PhD thesis.

To achieve the purpose of the study main part of the specialized scientific literature in English has been studied which is useful for the discussion of the essence and content of the different concepts such as "sustainable agricultural development" and "innovation and innovative technologies" as well as to define the methods applicable for this kind of research.

In the first chapter the PhD student gave enough attention and presented in details different knowledge, perceptions and concepts of the nature and types of innovations classified according to specific criteria, as well as the stages of the innovation process are considered. There is also a discussion about the application of innovative technologies in agriculture and the reasons for seeking such solutions today: the negative side effects of current technologies, natural resources status with an emphasis on the land resources as a major production factor, climate changes and adverse effects on different productions and industries, consumers preferences and requirements and the society's expectations for the provision and maintenance of a certain level of public goods as a whole. The PhD student succeeded also to present the necessary conditions for the development of innovations in the agriculture, namely the favourable market conditions, national policies and access to scientific knowledge etc., as well as the position of stakeholders from the public and private sectors. The concept of precision agriculture, the components ensuring its correct implementation, the advantages and opportunities for utilization of this opportunity by farmers are considered in details, taking into account as well the applied policies in the sector. Having in mind the discussion so far, the PhD student managed to formulate and present a methodology for research, namely: evaluation and analysis of the effectiveness of the technological solutions implementation following precision farming practices in a particular sub-sector, giving an example of soft fruits.

In the second chapter the PhD student performed specific field research applying the methodology developed in the previous chapter. The author correctly presented the place and the role of soft fruits in national agricultural output, which he chose as an example for conducting the research. He discussed and presented also opinion on the potential for soft fruits production development in our country in view of the existing natural and climatic conditions and trends in consumer behaviour and consumption. In this part of the study it is clear that the PhD student is well acquainted with the object of his research and understands well the various technologies and technological solutions in precision farming, applied in each of the presented case studies, explaining the advantages and future possibilities for future implementation of each one of them in United Kingdom and Bulgaria. Next, the economic analyses of costs, revenues, profits are presented and it reveals the differences in each of the technological solutions applied in specific farms in both countries.

In the last part of the PhD thesis (third chapter) the author analyses the possibilities and the needs for the introduction of digital solutions in agriculture and he revealed his point of view on the possibilities for

future technological development of agriculture in Bulgaria based on the digitalization of the processes. A number of strategic documents have been considered as well, where the topic is covered and the implementation of which would allow better implementation of innovative solutions in the country. It is also important that the PhD student presented a survey about the state, the innovative technologies usage and the attitudes of farmers towards innovations introduction in the future, with an assessment of possible changes in the farm itself in terms of resource use and economic results.

At the end of the thesis, the conclusions and recommendations are presented giving specific proposal about effective use of different opportunities and new technologies in the agricultural sector in our country.

The PhD student uses the terms precisely and correctly in view of what is generally accepted in the economic theory and what is legally established in the normative documents. The variety of publications by type that the author uses makes a good impression.

6. Contributions achieved in the PhD thesis.

The presented research proves that the PhD student has profound knowledge about the scientific literature and scientific achievements in the field of agricultural sustainable development and innovative solutions in agriculture. He also has mastered and applied relevant research methods and tools with a focus on analysis of the efficiency of various production methods/practices and in particular the application of precision farming in the production of soft fruits. Thus, the PhD candidate achieved specific scientific and practical contributions, duly formulated in the autoreferat.

The contributions from scientific and practical point of view are correctly formulated in the autoreferat and correctly reflect the achievements in the PhD thesis. I accept them and give them a positive assessment, highlighting the following scientific and applied practical contributions.

Scientific contributions

- 1) The PhD student successfully solved the problem to analyse effects from the innovations implementation in agriculture, developing and following a specific model to clarify their nature, types and features, which allows to define specificities and formulation of recommendations.
- 2) In my opinion, a very good assessment and special attention should be given to the definition of the precision farming and the developed methodological framework for research and evaluation of the effects of the application of innovative technologies in precision farming.

Applied practical contributions

- 1) Very good assessment should be given to the organization and conduct of the field research having in mind the lack of official statistical information about the economic results of the application of different technologies in agriculture (especially in the sector of soft fruits), which helped to the PhD student to clarify differences in productivity, costs and revenues under different technologies in each of the case studies.
- 2) The author makes good use of the results. On the first place he evaluated and analysed the effect of the innovative technologies application in the production of soft fruits and on the second place he identified the role and the importance of research and science to stimulate innovations in the agricultural sector justifying also his recommendations in this field. Last but not least, in regard to the constantly emerging

problems, despite strictly followed policies, new actions and measures are clearly needed in terms of institutional support for the implementation of innovations and digitalization of the agricultural and rural areas development.

7. Critical notes and questions.

The reviewed thesis has its merits and the critical remarks mentioned below do not decrease the qualities of the study. Even the notes should be considered by the PhD candidate more as recommendations for his future work. Actually, this is my main recommendation to him: he has already gained knowledge and learned to use scientific tools for analysis as well as he proves that can organize and perform scientific study and it would be good to continue his research on the topic, because it is important and it will be from crucial importance for the future development of the sector and the challenges we face. In this sense, I would recommend Dobri Dunchev to express his position more clearly and categorically, as at the moment the text presents the achievements by other scientists and it lacks the critical view of the main concepts considered and those adopted in the development of the PhD thesis. An important point here is the literature the author used. The author's efforts to present basic research and well-known authors on each of the issues make a good impression, but especially on the topic of innovation it is important to reflect the latest of such research. Therefore, I recommend the author to pay attention to works published last year. This is an important point when the place and role of the specific research should be outlined as well as the contributions to unsolved issues and problems.

Next, Dobri Dunchev in his subsequent work could better organize his work by presenting at the beginning of the text a list of tables, graphs, and used abbreviations, which will help the reader and allow quick reference if necessary.

For the correct performance of each research task it is necessary to indicate the limitations within which the research was conducted, which is my next recommendation again for the future work of the author.

I have two questions that I would like to ask the PhD student and on which I will be happy to hear his opinion during the PhD thesis defence, namely:

- 1) According to him, what are the challenges for farmers from the different subsectors of agriculture to introduce and utilise the benefits of precision farming technologies?
- 2) The doctoral student presented an analysis in which investment decisions are considered. How the requirements of the investment theory for real assets investments evaluation are taken into consideration and in particular, those requirements for determining the different cash flows and their evaluation taking into account the required rate of return in this analysis?

8. Published articles and citations.

The PhD candidate Dunchev presented 5 publications in relation to the thesis, which are directly related to the topic of the dissertation and reflect the main parts of it. For review are submitted: one article (in the scientific journal *Trakia Journal of Sciences*) and four publications as a co-author (co-authored with other researchers and his supervisor) issued in scientific journals in the country and abroad (*Scientific papers of the Agricultural University - Plovdiv* and journals *Agricultural Sciences* and *Problems of Agricultural Economics*). The publications are made in the period 2019-2020, and I consider that they are published in prestigious journals, which fully meet the quantitative and qualitative requirements for acquiring the educational and scientific degree "Doctor". The predominant number of joint publications and the work

of the doctoral student on projects are a good example of his ability and capacity to implement joint activities and to work in a team.

A list of citations is not provided, but it is not necessary according to the requirements for PhD students. The presented autoreferat objectively reflects the structure and content of the PhD thesis. It is presented in text of 34 pages and includes the general characteristics of the dissertation, its structure and content. A short exposition of the dissertation is presented, emphasizing the achieved theoretical-methodological and empirical results. Attached is presented also a reference for the main scientific and applied practical contributions achieved in the PhD student work, as well as a list of the author's publications related to the thesis.

CONCLUSION:

Based on the different research methods learned and applied by the PhD student, the correctly performed field studies, the final conclusions and recommendations, I believe that the presented thesis meets the requirements of Bulgarian national law and the Regulations of the Agricultural University for its application, which gives me reason to evaluate it **POSITIVE**.

I feel confident to propose to the highly esteemed Scientific Jury also to vote positively and to award *Dobri Mateev Dunchev* the educational and scientific degree "*Doctor*" in the scientific specialty "Economics and Management (Agriculture)"

Date: 31.07.2020г.
Sofia

Reviewer:

(Assoc. Prof. Dr. Mariya Peneva)

