

REVIEW

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on a dissertation for obtaining the scientific degree “Doctor of Science” in the field of higher education 6 “Agricultural Sciences and Veterinary Medicine”, professional field 6.5. “Forestry”, scientific discipline “Forest Management Planning and Forest Inventory”

Author of the dissertation: Assoc. Prof. Dr. Ivailo Ivanov Markoff

Title of the dissertation: “Research on forest valuation in the Republic of Bulgaria”

Member of the scientific jury: Prof. Dr. Ivan Petrov Paligorov

1. Introduction of the author.

Assoc. Prof. Dr. Ivailo Markoff graduated with a Master's degree in Applied Mathematics (1980) and a Master's degree in Computer Science (1982) at the Technical University (VMEI), Sofia. Since 2017 he has been a doctor in Forest Management Planning and Forest Inventory.

In the period 1981-1989 he was a designer and head of the department for electronic data processing in IPPGSS Agrolesproekt, Sofia. In 1989 he won a competition and became a research associate II degree at the Balkancar-Progress Institute, Sofia. In the period 1990-1994 he was a research associate I degree and head of a development unit at IPPGSS Agrolesproekt, Sofia. From 1994 to 2017 he was a research associate I degree (Chief Assistant) at the Institute of Forestry, BAS. Since 2018 he has been an associate professor, and since 2019 he has been the head of the Department of Forestry and Forest Resources Management at the Institute of Forestry, BAS.

2. General characteristics of the dissertation - volume and structure.

The dissertation has a volume of 213 pages of text, which includes: 203 pages of main text of the work, 2 pages of list of contributions and implementations for which the author claims, 1 page with a list of 12 publications on the dissertation, 6 pages with cited literature and 2 pages with a summary in English. The content is structured in an introduction, a brief review of the literature, methodical part - exposition of the basic concepts on a total of 33 pages, results and discussions on individual hypotheses and elements of forest property valuation a total of 16 parts on 163 pages, discussion and conclusions on 6 p. There are tables and figures in the text that illustrate the presentation appropriately. In the methodical part 42 formulas are indicated, which are used further in the argumentation of the obtained results.

3. Relevance of the problem.

The valuation of forests and their diverse resources and functions has been of great interest to both science and forestry practice for more than 200 years, when the first textbooks on forest valuation in Europe were written. The various national schools for forest property valuation and investment valuation are presented, as well as the most important textbooks and tools for forest valuation in Europe and in Bulgaria. Although very briefly traced the development of the theory and understanding of economic evaluation of forests in the last more than 100 years. The

advantages and disadvantages of the various methods and approaches for valuation of forest properties are studied mainly in terms of the possibilities for precise and accurate determination of the income of their owners, as well as by calculating the necessary costs in the long run. The reasons for the difficulty of using discount methods in the assessment of forests, especially the long production period, are indicated. Different approaches, hypotheses and methods for forest valuation, different elements of their properties and determination of their values are presented, as well as their application in a software product for forest valuation developed by the author of the dissertation, which is applied in the practice of forest valuation. forests in our country.

In this sense, the topic of the presented dissertation is dedicated to a a live question, both from scientific and practical points of view.

4. Knowledge of literature.

The author demonstrates an impressive literary knowlede. The dissertation refers to 112 sources - 61 in Cyrillic and 51 in Latin. 10 of the sources are by-laws - regulations, ordinances, instructions and standards, 12 are textbooks, manuals and teaching aids.

5. Methodical approach.

An overview and presentation of the classical theory of forest valuation over the last more than 100 years, mainly in Germany, is presented. The formulas of the classical theory are derived and their field of applicability is studied. A positive theory of the income value of forest land is substantiated, formulas for valuation of perennial crops in agriculture are derived and a comparison is made with the "forest expetation value" and "forest cost value" of forest stands. Formulas are derived and their application is analyzed, in different hypotheses, for valuation of land, forest stands and forestry damages, based on the monetary value of an individual tree and of a forest stand. The changes that have occurred during the different periods are presented, as well as the results of research on the issue through the prism of the 20-year history of forest valuation in Bulgaria, in which the author is a direct participant and his contribution is significant. The presentation reflects the complexity and responsibility of the application of approaches and methods for forest assessment, as well as the inevitability of omissions and even some errors that result from the specifics of appraised real estate.

6. Significance of the obtained results, interpretations and conclusions.

I definitely believe that the presented dissertation contains a sufficient amount of research material, which includes the use of relevant mathematical methods, derived and further developed for use in the practice of forest valuation in our country. It can be emphasized that the dissertation is a summary of the author's activity in this field and presents his achievements, both in the summary of the theory and in its application in the practice of forest valuation..

The experience gained by the author is realized in the software product "V.valuation of forests and forest land" with several updated versions, which was approved by the Executive Forest Agency at the Ministry of Agriculture, Food and Forestry and applied in training practice and practical valuation of forests in Bulgaria. He participated in a project for preparation of "Methodology for integrated monetary valuation of forest resources in the Republic of Bulgaria" in 2011-2012.

7. Contributions of the dissertation.

I evaluate the contributions in the presented dissertation as a generalization of known theoretical formulations in the field of forest valuation and on this basis the discovery of new dependencies and the derivation of new aspects and options for their application. New scientific facts have been accumulated, as well as results from the application of the proposed methods, which has allowed to improve the training of valuers, as well as the practice of forest valuation.

In particular, the following indisputable achievements in improving the methodology and further development of certain theoretical formulations can be pointed out:

1. Both the unity of the principles of valuation and the grounds for the specifics of valuation methods in forestry are shown in an original way, and a quick and accessible way of presenting the classical theory is proposed.
2. The classical theory has been adapted to the practice of self-financing of forestry or financing of afforestation from a trust fund raised with logging fees. A proof of von Spiegel's empirical formula for the valuation of bare land is given. A distinction is made between the field of application of the classical and generalized theory: as application field of the latter, the forms of forestry with an internal rate of return of less than 4% are recognized.
3. A proof of the formula for valuation of potential development ground (discounted probability formula), known so far without justification, has been given.
4. An adaptation has been made and a proof of Weimann's method for valuation of forest land has been given: the method is derived from the theory of income value and on this basis its field of application (lands with a high level of land prices) has been determined. A combined method is proposed that overcomes this limitation while preserving the merits of the method.
5. Based on Blume's formula, the magnitude of the error of the valuation was theoretically investigated with recommendations for the accuracy of the measurements.
6. A formula has been derived for the relationship between the financial stocking rate and the maturity stocking rate of forest stand - its stocking rate in the age of rotation. Based on the growth tables, a formula for determining the maturity stocking rate is derived. The applicability in Bulgaria of the tables known in the literature for the financial stocking rate has been confirmed.
7. A formula for valuation of land in attractive properties based on the market price of building land has been derived in compliance with the requirements of the current ordinance for valuation of real property in forestry areas.
8. A formula for provisional valuation of the local market price of building land based on

local prices of apartments and buildings has been derived.

9. A formula for evaluating an individual tree, formerly known as empirical, has been derived.
10. A standard representation of the value of damage to forest stands is proposed - a formula method is defined (formulas and a rule for choosing between them), which covers the types of damages known in the literature.

As achievements of scientific and applied nature can be pointed out:

1. Participation in the development of the normative base of the Ordinance for the valuation, with original author's format of the applications and the first numerical values, incl. a number of value indicators - prices of wood in stock, costs of felling and extraction, costs of afforestation, etc.
2. Development of the tables of the age factors that are necessary for the application of Blume's formula.
3. Development in co-authorship of monetary growth and assortment tables, which have been included in the latest versions of the regulation for valuation of forests.

8. Critical remarks and recommendations.

The presented dissertation, as the first in nature summary of the known theoretical formulations in the field of forest valuation, the derived new dependencies and new possibilities for their application demonstrate the high competence of the author in the field of forest valuation theory. The collected new scientific facts, as well as the results of the application of the proposed opportunities, has allowed to improve the training of appraisers, as well as the practice of forest valuation. Reading the work allowed to identify some shortcomings that the author should consider and possibly eliminate before a future publication of the work, which I recommend:

1. The work needs more precise editing and uniformity in layout and presentation, as is accepted in the scientific and educational literature, especially with regard to tables, figures and graphs. Some tables have headings in English and others do not. Data sources should be indicated if the data presented do not belong to the author (pp. 15, 16, 20, 23, etc.)
2. It would be better in some parts of the work, especially when analyzing or calculating values or coefficients in different hypotheses, to add a more detailed explanation, which is probably sufficient for the author, but not for all students or users of the methods.
3. A glossary of necessary architectural terms is proposed, which is very valuable, but should be indicated if it is not created by the author (pp. 120-121). At the same time, there are terms in the work that do not have a definition accepted by the author, and

their use in a literal translation is imprecise, e.g. management capital (p. 30), rents and their interpretation. At the same time, there is no mention of the forest interest rate used in financial calculations in forestry in the last century.

The main purpose of the recommendations and notes is to help improve the presented dissertation before its possible publication, as well as to provide the author with an opportunity not only to defend his indisputable achievements, but also to offer him ideas for further research.

9. Evaluation of the quality of scientific publications.

The author has attached a list of 6 monographs, of which I consider 5 (printed in the period 2005-2012) as entirely dedicated to the valuation of forests or partially dedicated to the economic indicators used in the valuation of forests. Six scientific publications are presented, published in refereed and indexed publications in the period 1998-2020, of which I consider 5 to be devoted to the presentation of methodological issues and results of forest valuation in various cases. Nine articles and reports are presented (I accept 7), published in journals with scientific review and 1 journal referred to in VINITI (Management and Sustainable Development, of which I have the responsibility to be editor-in-chief). Separately mentioned are 9 articles and reports published in edited collective scientific papers in the period 2001-2019, devoted to certain aspects of the valuation of forests or to certain economic or biometric issues. The presented publications, as well as the table for the implementation of the national requirements show that the author exceeds the minimum requirements for the scientific degree "Doctor of Science".

The works of Assoc. Prof. Dr. Markoff are the basis of the regulations, such as monetary tables for valuation of single trees and whole forest stands, which are part of the adopted and published in the State Gazette "Ordinance for valuation of real estates in forestry territories" (SG, issue 63 of 16.08.2011) - Annex №19, Annex № 20 and Annex № 21, a number of proposals for changes in the period from 2005, 2008 and 2009 of the then "Ordinance for determination of basic prices, prices for the excluded areas and establishment of the right of use and easements on forests and lands from the forest fund", and in 2011 a draft of "Ordinance for valuation of real estates in forestry territories" at the Executive Forest Agency.

Results from the work of Assoc. Prof. Dr. Markov were included in the training of participants in courses on valuation of forests and forest land, organized by the Forest Research Institute at BAS in the period 1999-2011. During the period 1999-2011 Assoc. Prof. Dr. I. Markov was a member of the Central Valuation Commission at the Forest administration, the former State Forest Agency, now termed the Executive Forest Agency. From 1999-2020 there are many publications at home and abroad, projects, expertise related to the valuation of real estate in forest areas.

10. Personal contribution of the author.

The presented dissertation, as well as the list of publications and the table for the implementation of the national requirements show that the author has very precisely defined his participation, especially with regard to the collective works. I can say with conviction that the contributions claimed by the author are his personal work and fall within the scope of the field 6 of higher education "Agricultural Sciences and Veterinary Medicine", professional field 6.5. "Forestry" and scientific discipline "Forest Management Planning and Forest Inventory".

CONCLUSION:

Based on the generalized and further developed theoretical statements presented by the author, the new scientific facts obtained with the application of the proposed research methods, the correctly performed transformations and inductive and deductive conclusions, I believe that the presented dissertation meets the requirements of ZRASRB (the Law on the Development of the Academic Staff in the Republic of Bulgaria) and the Regulations (the Regulations on acquiring scientific degrees and holding academic positions at the Bulgarian Academy of Sciences), which gives me reason to evaluate it **POSITIVELY**.

I propose to the esteemed Scientific Jury to vote positively and to award Assoc. Prof. Dr. Ivailo Ivanov Markoff the scientific degree “**Doctor of Science**” in the field of higher education 6 “Agricultural Sciences and Veterinary Medicine”, professional field 6.5. “Forestry”, scientific discipline “ Forest Management Planning and Forest Inventory”.

Date: 17.02.2021

REVIEWER:

Prof. Dr. Ivan Paligorov