OPINION
on the dissertation for the degree of "Doctor of Science"
at the Academy of Economics "D.A.Tsenov" - Svishtov

The opinion was prepared by Assoc. Prof. Ivan Rashkov Marchevski PhD, from the Academy of Economics "D.A.Tsenov", appointed as a member of the scientific jury according to the Order of the Rector of the Academy of Economics "D.A.Tsenov" No. 253 of 25.03.2026. The decision to prepare an opinion was taken at the first meeting of the scientific jury on March 27, 2026 at 11:00.

Author of the dissertation: Prof. Todor Borisov Krastevich PhD

Topic of the dissertation: "THE LIFETIME VALUE OF THE CUSTOMER (CONCEPTUAL, METHODOLOGICAL AND APPLIED ASPECTS)"

GENERAL DESCRIPTION OF THE DISSERTATION

The dissertation has a total volume of 320 non-standard pages and includes an introduction, main body with 5 separate parts, a conclusion and appendices. 31 figures and 29 tables are used for illustration. The bibliography includes 356 titles, all in English.

The structure of the dissertation is balanced and follows a logic that allows achieving the goals of the research.

The object of the dissertation is "*the processes of assessment, forecasting and use of the customer lifetime value concept in marketing analytics and in the strategic management of customer relationships*. The subject of the research is "*the construction, testing and comparative analysis of various models for forecasting the customer lifetime value, with a special focus on the application of machine learning algorithms*". The object and subject of the dissertation are clearly and correctly defined from a scientific point of view.

The author's main research goal is "*to develop and empirically validate a predictive framework for estimating customer lifetime value by comparing classical probabilistic approaches and modern machine learning algorithms, with an emphasis on their applicability in non-contractual, digitally-based consumption contexts*".

To achieve the goal, *4 objectives* have been formulated: 1) theoretical clarifying the concept of CLV and derivation of the existing challenges to the computational procedures used in theory and practice, 2) development of an analytical framework for comparing existing approaches to CLV modelling, 3) construction of CLV prediction models and their testing based on real data and 4) Formulation of recommendations for use of the developed procedures and tools in marketing decisions.

Within the framework of the scientific research, the author defines *6 research hypotheses*, the validity of which is verified by empirical data.

The text is logical and the approach used is correct - a critical analysis of existing knowledge, outline the currently unsolved problems, development of an original methodology for solving some of the identified problems and testing the methodology using modern tools. This approach is correct and creates the necessary prerequisites for achieving the main research goal and the tasks related to it.

NOVELTY OF THE RESEARCH

A basic requirement for dissertations for the acquisition of the scientific degree of "Doctor of Science" is that they solve major scientific or applied scientific problems that correspond to modern achievements. In the spirit of this requirement, it can be argued that the relevance of the researched scientific problem is beyond doubt. My arguments for such a statement are as follows.

First. In the era of widespread digitalization, the presence of huge data sets (Big Data) and the widespread penetration of artificial intelligence (AI), the ability of organizations to attract, retain and develop profitable customers is becoming a major competitive advantage. The dissertation offers approaches and methods for transforming "raw" data into strategic knowledge through the CLV metric.

Second. Traditional statistical methods are no longer sufficient to capture the complex, nonlinear dependencies in the behaviour of the modern consumer. The relevance here is expressed in the developed ideas for implementing machine learning (ML) and deep learning (DL) as tools for predicting customer value.

Third. In economic uncertainty and a growing need for efficiency, business no longer tolerates inefficient use of marketing budgets. In this context, the work provides convincing evidence that CLV can be used as a key criterion for optimizing marketing budgets and offers a toolkit for this.

Fourth. The ethical challenges associated with the use of AI are an increasingly visible focus in society. In this sense, the topic of the ethical use of algorithms and the protection of personal data (GDPR) is hotter than ever. The dissertation addresses these issues in parallel with the technical aspects, which makes it socially and managerially relevant.

Fifth. Interdisciplinary research is still rare in the bulgarian economic literature. The dissertation represents an impressive combination of marketing theory, big data science, and the application of AI to support marketing decisions.

In summary, Prof. Krastevich's dissertation fills a significant gap in the Bulgarian marketing literature, offering a modern methodology that is fully in line with global trends in data science and strategic marketing management.

ACHIEVED SCIENTIFIC RESULTS

The dissertation is a large-scale study that offers a systematic view of the concept of CLV in the era of ubiquitous digitalization and AI. The approach chosen by the author in solving the scientific task is correct. It follows the classical logic of scientific research - a critical analysis of existing knowledge with the derivation of problems unsolved in theory, providing a new and original solution to some of the outlined problems, validating the proposed methodologies, models, methods and techniques and formulating guidelines for use of new knowledge in practice.

In the introduction and in the first chapter, the author lays the foundation of the study. The evolution of the concept of CLV from the 1990s to the present day is outlined, emphasizing the transition from a product-centric to a customer-centric approach. The main scientific result here is the systematization of CLV definitions and the clarification of the economic logic in which customers are considered as a marketing asset of the company (pp. 24-25). The author

successfully connects marketing and finance, proving that aggregated CLV can be used as a direct indicator in assessing the market value of the company.

Chapter two offers a detailed and comprehensive typology of CLV measurement models. The scientific result here is the critical comparison of several classes of models:

- Deterministic: based on NPV and average values.
- Heuristic: extended RFM approaches.
- Probabilistic (BTYD): Pareto/NBD and BG/NBD.
- ML and DNN approaches: development of neural networks (LSTM) to capture nonlinear dependencies.

An important conclusion in this part is that the choice of a model is not a universal act, but depends on the "analytical maturity" of the organization and the type of data available.

The third and fourth chapters develop the methodological framework of the study. The third part analyses the influence that the nature of the supplier-customer relationship (contractual or non-contractual) has as a guide in the choice of a prognostic framework. The specifics of modelling CLV in contractual and non-contractual relationships are described. Special attention is paid to the problem of "observability of churn", which is critical for non-contractual businesses such as e-commerce. The main scientific result here is the definition of different modelling approaches depending on the type of supplier-customer relationship.

The fourth part examines the issues of operationalizing the procedures for calculating CLV. The part begins with a clarification of the components of the CLV model, proceeds through a description of the main assumptions in the modelling and the challenges in the preparation and pre-processing of the data and describes the indicators that can be used in evaluating and comparing the different CLV models. High marks in this part are given to the summaries of Prof. Krastevich regarding the existing problems of a methodological and computational nature, which can serve as a basis for future research on the issue.

In the fifth chapter, which is the applied core of the work, the toolkit developed in the previous parts is tested and recommendations for the practical use of the results are formulated. In it, the author prototypes three classes of models:

- Probabilistic (BG/NBD + Gamma-Gamma), calibrated on transactional data.
- Machine-learned (Random Forest, XGBoost), using an extended set of behavioural predictors.
- Bayesian model using MCMC algorithms for uncertainty assessment.

The result in this part is empirical proof of the author's thesis that hybrid approaches, combining statistical rigor with the flexibility of machine learning, provide the highest predictive accuracy.

STRENGTHS OF THE DISSERTATION

The work has a number of strengths that make it a significant scientific achievement. Specifically:

1. Exceptional methodological depth. Unlike most authors, Prof. Krastevich is not limited to one or a few approaches to measuring and assessing CLV, but explores the entire spectrum of analytical tools - from the classic Pareto/NBD to modern algorithms such as Random Forest and XGBoost.

2. Interdisciplinary synthesis. The work is a bridge between three disciplines - marketing, econometrics and data science. The author unites classic statements from the works of marketing authors such as Rust and Lemon with the mathematical complexity of the stochastic distributions of Fader and Hardie and the capabilities of ML.

3. Empirical rigor. The author's hypotheses are not simply declared, but subjected to verification through testing. The comparative analysis between probabilistic and ML models is done with methodological precision rarely found in bulgarian literature.

4. *Integration of marketing and artificial intelligence.* The work successfully translates the complex algorithms of ML into the language of marketing management. It is demonstrated how predictive analytics can directly improve targeting, budgeting and customer equity management.

5. Ethical reflection. Prof. Krastevich pays special attention to the ethical considerations related to the use of the concept of CLV as a guideline for strategic marketing decisions, warning about the risks of the "black box" of algorithms and "algorithmic discrimination".

6. Program and algorithmic security One of the great advantages of the development is its applicability. The dissertation does not remain only in the realm of theory. The author offers ready-made program code that can be used to estimate CLV in various product-market contexts. This makes the study not just a text, but an "analytical protocol" for marketing professionals.

SCIENTIFIC CONTRIBUTIONS OF THE DISSERTATION

I firmly believe that the work of Prof. Krastevich represents a contribution as a complete product, because it demonstrates how data-driven marketing should function. In addition to this, the work has specific contributions that can be distinguished in three directions.

Scientific and theoretical contributions

1. A unified conceptual framework has been built that unites the classical marketing theory of customer value as a company asset with modern data science. This allows CLV to be considered not just as a formula, but as a strategic tool for marketing decisions.

2. A comprehensive typology of CLV models has been developed, which classifies the approaches according to their complexity, interpretability and data needs, which can serve as a navigator for researchers in the field.

Contributions of a methodological nature

1. A hybrid methodology for measuring customer lifetime value (HybridCLV) has been developed and tested. The paper proves that including probabilistic estimates of "survivability" as input data in ML models significantly increases the accuracy of predictions.

2. A procedure for Bayesian calibration of CLV models has been implemented, which allows marketers to assess not only the expected value, but also the risk (confidence intervals) when evaluating customers.

Applied contributions

1. Ready-to-implement prototypes for measuring CLV, applicable in the e-commerce and SaaS sectors, have been developed.

2. A risk-value matrix for customer segmentation has been proposed, which allows for automated generation of management rules for churn management and promotion of cross selling.

EVALUATION OF THE ABSTRACT

The abstract, with a total volume of 34 pages, truthfully reflects the content of the dissertation and provides the necessary clarity regarding the research goal, tasks and the results achieved by the author.

CRITICAL NOTES AND RECOMMENDATIONS

I have no critical notes on the work.

ASSEMENT OF PROF. KRASTEVICH'S PUBLICATIONS

All publications by Prof. Krastevich are on the topic of the dissertation or close to it. It should be noted that the majority of them are large-scale papers (monographs and studies) published in well-known scientific journals (5 are in journals indexed in the SCOPUS database) and in all of them the author's enduring interest in data-driven marketing can be found.

DEGREE OF FULFILMENT OF MINIMUM NATIONAL REQUIREMENTS

From the information provided in the "Report on the fulfilment of the minimum national requirements in area 3. Social, economic and legal sciences, professional field 3.8. Economics, for the award of the scientific degree "Doctor of Sciences", I conclude that the scientific production of Prof. Krastevich significantly exceeds the minimum national requirements both in terms of the total number of points (690 with a required 350), and in separate sections - 395 points from publications, with a required 100 and 145 points from citations with a required 100.

In the dissertation and the abstract, I did not find the use of foreign texts, beyond the usual reference to authors and their works, which are correctly indicated in the list of references. My conclusion is that I have not found plagiarism in the dissertation work.

CONCLUSION

The dissertation is a complete and original study, which contains theoretical generalizations and offers innovative solutions to current problems in marketing theory and practice, which represent an undeniable contribution to the development of economic science and in this capacity fully meets the requirements for awarding the scientific degree "Doctor of Sciences". The scientific output of Prof. Krastevich covers the minimum national requirements for acquiring the scientific degree "Doctor of Sciences" in the field of Economics.

These facts give me reason to propose to the esteemed Scientific Jury to award Prof. Todor Borisov Krastevich PhD the scientific degree "Doctor of Sciences" in the scientific specialty "Marketing" from the professional field "Economics".

20.05.2026

Author of the opinion: .....
(Assoc. Prof. Ivan Marchevski PhD)