

О P I N I O N

from Assoc. Prof. Irina A. Radeva, PhD

Institute of Information and Communication Technologies - BAS
on Thesis to acquiring the educational and scientific degree "Doctor"
in professional field 4.6 "Informatics and Computer Sciences"

Doctoral Program "Informatics"

Titled: "INDIVIDUALITY AND DECISION-MAKING MODELS IN INTERNET"
by Rumén Ruménov Ketipov

By order No.129/27.05.2021 of the Director of IICT - BAS Prof. G. Angelova, DSc in accordance with Art. 4, para. 2 of the Act on development of the academic staff in the Republic of Bulgaria and by decision of the Scientific Council of IICT (protocol No.5/03.06.2021) in connection with the procedure for acquiring the educational and scientific degree "Doctor" in professional field 4.6. "Informatics and Computer Sciences", Doctoral Program "Informatics", by Rumén Ruménov Ketipov with PhD Thesis on "Personality and decision-making models in Internet" with supervisor Assoc. Prof. Vera Angelova, PhD I am appointed a member of the Scientific Panel.

When evaluating the Thesis, the conditions of the Law for the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Regulation on the Implementation of the Development of Academic Staff in Republic of Bulgaria Act (RIDASRBA) (Decree No 202 of 10.09.2010, amend and suppl. SG 15/19 February 2019) and the Regulations on the specific conditions in the IICT-BAS for implementation of the law are determinative and applicable.

According to RIDASRBA and the Regulations on the specific conditions in the IICT-BAS, the minimum required number of points by groups of indicators for "Doctor" is 4.6. "Informatics and Computer Science" are:

Group of indicators	Content	Number of points
A	Indicator 1	50
D	Sum of Indicators from 5 to 10	30

The Thesis is in volume of 242 pages, 36 figures, 24 tables and includes: abstract in Bulgarian and English, list of abbreviations used, list of tables, list of figures, introduction, three chapters, conclusion - summary of the results, publications, scientific and applied results, declaration of originality of the results, bibliography of 273 references and two appendices.

The **Abstracts** are in Bulgarian in the volume of 53 pages and in English in the volume of 48 pages and present the Thesis.

The aim of the Thesis is formulated on pp. 3-4: ...to investigate the presence of significant relationships between personality and some of the basic e-shops features. Based on the obtained results, it also aims to create models for reliable prediction of consumer preferences and behavior in the purchasing decision-making process based on their personality profile.

Based on this the study objectives are defined as follows:

- To study the existing various theories and concepts for personality measurement and to choose an appropriate psychometric model for the study.
- To choose a set of e-shops functionalities that are typical and applicable to most of them.

- To create a research strategy and design, respecting basic standards of ethics and neutrality; to translate the research into three languages - Bulgarian, English, and German to ensure its wider scope and validity; the aspect of risk averseness to be considered as additional personality determinant; to analyze the study's results and to establish if there is a relationship between chosen independent and dependent variables.
- To propose and implement two (or more) ML models in order to be achieved reliable prediction for the dependent variables in the existing significant correlations and to analyze the achieved results; to choose an appropriate ML model and to propose and implement optimization;
- Based on the achieved results of the conducted study to be developed and determined the consumer behavior models in the process of decision-making in the field of e-commerce.

The formulated aim and objectives have scientific and applied scientific potential and are relevant in the context of trends in the development of information technology.

The Thesis is interdisciplinary in the fields of psychology and informatics and computer science and explores the relationships between the decision-making process and the personal characteristics that determine consumer behavior in online commerce. According to the set goals and objectives, it is designed, prepared and conducted a study in order to quantitatively and qualitatively assess data on the personality traits of online users and their preferences for selected basic characteristics of web stores.

The application of machine learning methods in the study of individuality and the prediction of consumer behavior and expectations depending on the characteristics of individuality has been studied.

The documentation of the research and its results are presented in synthesized, systematized, specific and comprehensive manner.

The obtained **results** are formulated as scientific-applied and can be briefly systematized as follows:

1. Based on a literature review and analysis, a strategy for empirical research has been selected and a research questionnaire structure based on the TIPI (Ten Item Personality Inventory) test has been determined as a psychometric tool for assessing consumers' personalities and forecasting their e-commerce preferences.
2. A self-managed questionnaire (survey) with 4 sections was developed, implemented with a web-based application for research (Google Forms) in 3 languages (Bulgarian, English and German) in order to establish the attitude of participants to online shopping and to various characteristics of the web. shops. 19 functionalities of the e-shops have been selected, categorized in 3 subgroups.
3. A 15-day online empirical survey of 226 people from 10 countries was organized and conducted. The assumption of the existence of empirical connections between a person's personal characteristics and his behavior has been confirmed.
4. Three models for machine learning have been developed: linear regression, decision tree and random forests. Optimization of the method of random forests with cross-validation using lattice search using the GridSearchCV class of the scikit-learn library, as well as optimization using TPOT (Tree-based Pipeline Optimization Tool) for genetic programming has been proposed and implemented. Models are Python, version 3.8 (64-bit).

5. As a result of the empirical study and the results of the experiment are compiled models of consumer behavior in decision making in online commerce.

I accept that the results obtained and presented cover the scope of the set goals and objectives. All stages of preliminary research, analysis, preparation, development and experiments are correctly documented and describe the range of possible theoretical and practical applications. The results presented in the dissertation have the potential for further development.

There are presented 8 publications on the Thesis: 3 publications are in journals with SJR (NNo. 5 - Q3, 6 - Q2 and 7 - Q4), 1 publication is in a journal (No. 8); 5 publications are in conference proceedings (NNo. 1, 2, 3, 4 and 9). The presented publications are for the period 2018 – 2021, 2 publications are in Bulgarian and 7 in English. All publications are co-authored.

The PhD student has been awarded a diploma by the Director of IICT for very good scientific achievements in 2019 in the category "PhD students".

The scientometric indicators of the candidate in group D exceed twice the minimum specific requirements of IICT - BAS for acquiring the educational and scientific degree "doctor": with minimum requirements for 30 points 60 points have been achieved.

In the presented list of noticed citations of the scientific publications on the Thesis there are 3 citations of 3 publications.

The conditions of the RIDASRBA and the Specific Conditions Regulations of IICT – BAS are fulfilled.

Questions on the Thesis:

1. How many definitions of the term "personality" do you use in your dissertation? Can you give your definition that best serves the purposes set in your work?
2. Based on the study of the techniques and methods for assessing the individuality, behavior and decision-making patterns of consumers in e-commerce, do you think there are studies conducted without the knowledge of consumers and grounds to assume that the results are used for manipulating their choice?
3. Do you have an opinion on how computer science and computer technology can help psychology to explain the cognitive and behavioral patterns of man and his interaction with the information flows that surround him?

CONCLUSION

I accept that the Thesis meets the conditions of ASRBA, the RIDASRBA and the specific requirements in the IICT-BAS and I give a positive opinion for acquiring the educational and scientific degree "Doctor" of Rumen Rumenov Ketipov.

I propose to the Scientific panel to vote unanimously for Rumen Rumenov Ketipov the educational and scientific degree "Doctor" on 4.6. "Informatics and Computer Sciences", Doctoral Program "Informatics".

16.06.2021 r.

Signature:

Assoc. Prof Irina Radeva, PhD

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