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BOOK REVIEW

DESIGN AND APPLICATION OF INTELLIGENT INFORMATION SYSTEMS

Reviewed book: Dalė Dzemydienė. *Intelektualizuotų informacinių sistemų projektavimas ir taikymas*: monografija. Vilnius: Mykolo Romerio universiteto leidybos centras, 2006. 352 p. [Design and Application of Intelligent Information Systems, *in Lithuanian*].

Reviewer: *Prof. Dr Sc. Edmundas Kazimieras Zavadskas*, Vilnius Gediminas Technical University, Lithuania, *edmundas.zavadskas@adm.vgtu.lt*

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Title: INTELEKTUALIZUOTŲ INFORMACINIŲ SISTEMŲ PROJEKTAVIMAS IR TAIKYMAS [Design and Application of Intelligent Information Systems]

Subtitle: Monografija [Monograph]

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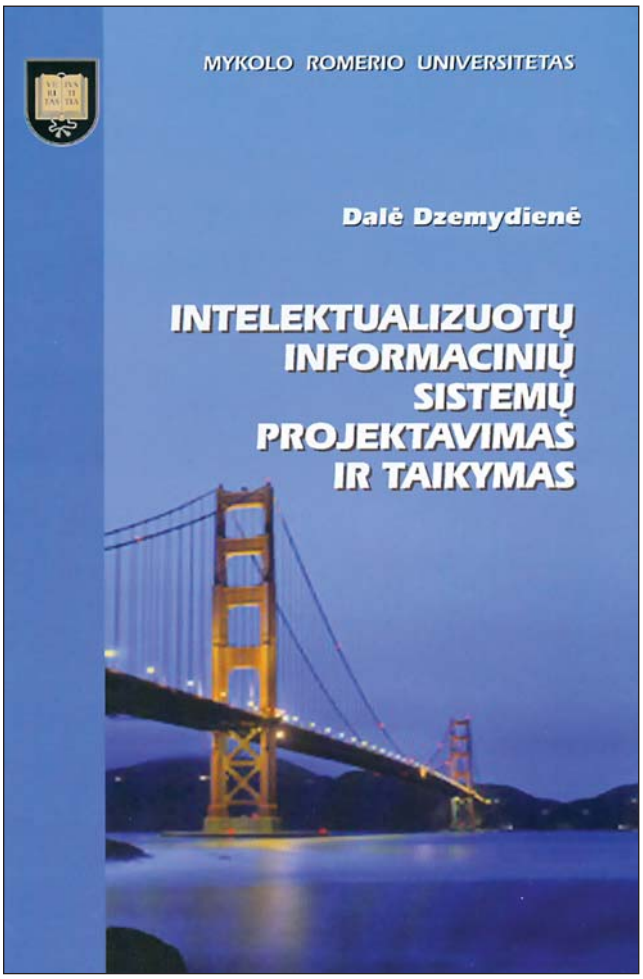

Intelligent information systems are growth collection of the latest developments in intelligent paradigms such as knowledge-based systems, computational intelligence, and integrated database systems, as well as practical applications in engineering, business, and management.

The applications of artificial intelligence methods play an important role in developing of innovative systems with capacities to assist, work as experts, advise, and help in solving complex decision-making problems of management in different domains.
The objectives of this manual book are to train in the development of intelligent information systems. The content covers interesting topics of systems design by using knowledge representation methods, information communication technologies for better understanding and evaluating management processes. The proper selection of novel work organization methods, knowledge management systems, modern information - communication technologies, and up-to-date methods of their control as well as mastering skills of these allow us to realize the management problems of organizations more clearly.

The aims of the monograph of Prof. Dr Dalė Dzemydienė are to educate information systems developers, business leaders, management specialists who will function as agents for a change toward sustainable development, and promote the role of eco-efficiency, innovation and corporate technological, social responsibilities.

The modern knowledge acquisition and representation approaches are proposed using ontology-based techniques that help in information retrieval and dissemination processes. A key part of the approach enforcement is to understand those activities, through the development and use of methods to realize the models and tools for collecting and then interpreting the large volume of data available in real time. Consequently, intelligence programs have been developed, leading to recognition of the fields of activities called business and sustainable management analysis, which has been described as the identification and the provision of insight into the relationship between potentially relevant data with a view to possible development scenarios realization. The approach of integrating different knowledge representation techniques and databases is proposed for aiding advisory processes in relevant recognition of patterns of business management and investigations.

The book discusses the application and impact of information systems, how to make them work by methods of artificial intelligence and support many different decision making processes.

The management of sustainable development of processes should be evaluated via the three perspectives: economic growth, ecological balance, and social progress. The book reveals some aspects of management of sustainable development processes. Properly set strategic plans and information infrastructure will make it possible to reduce costs, improve work conditions, minimize the risk, and create new opportunities, when analysing existing and evolving business entities.

The book is well designed and contains many useful components, which will be helpful to students and teachers, management specialists and conceptual designers of information systems. The book covers central topics such as database design, information systems architecture, distributed information systems, work flow management, data warehouse analysis, safeguard methods for information processing in the Web environment, intelligent decision support systems with components of data mining, case-based reasoning, and other applications of artificial intelligent methods. Essential techniques for the development of systems of dynamic process management and evaluation of performance are investigated, such as temporal logic, Petri nets, Evaluation nets, state machine learning, and multi criteria evaluation procedures. The book also includes useful applications ranging from ecological situation evaluation, contamination diagnosis and infrastructure development for multi-transport system management, to distance learning systems architecture improvements and e-service scenarios development for context management of e-documents.

Due to its depth and breadth of the coverage and the usefulness of the techniques and applications, this book is a valuable reference for experts and students alike. The book is written for researchers, systems designers, computer scientists, students, managers.

Keywords: intelligent information systems, knowledge representation, design and implementation of databases, knowledge-based systems, expert systems, decision support.

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BOOK REVIEW

GAME THEORY IN BUILDING TECHNOLOGY AND MANAGEMENT

Reviewed book: E. K. Zavadskas, F. Peldschus, L. Ustinovičius, Z. Turskis. *Lošimų teorija statybos technologijoje ir vadyboje*. Vilnius: Technika, 2004 [Game Theory in Building Technology and Management, *in Lithuanian*].

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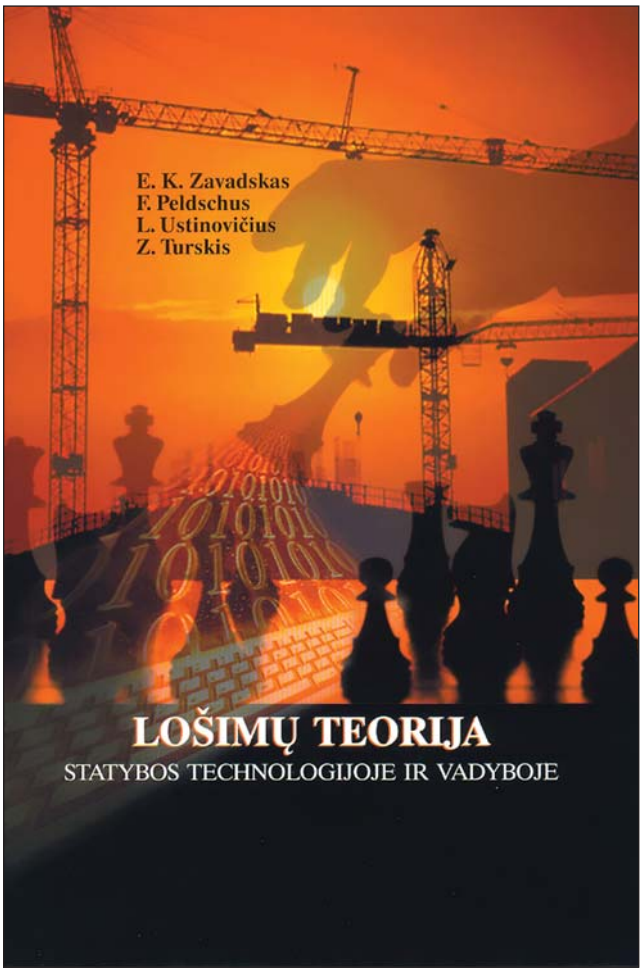

Title: LOŠIMŲ TEORIJA STATYBOS TECHNOLOGIJOJE IR VADYBOJE [Game Theory in Building Technology and Management]

Subtitle: Monografija [Monograph]

Year: 2004

Publisher: VGTU Publishing House "Technika"

Volume: 196 pages

Type of publication: Hard covers

Language: Lithuanian

ISBN: 9986-05-700-0

This book is primarily the outcome of long-term cooperation of two of its authors – E. K. Zavadskas (Vilnius, Lithuania) and F. Peldschus (Leipzig, Germany). These researchers have published five books as co-authors. The first book was published as long ago as in 1986 (Zavadskas and Peldschus 1986). They have also written together many articles, the first of which appeared in 1983 (Peldschus *et al*. 1983). The monograph being reviewed was prepared by them in cooperation with two other authors. This cooperation continued after the considered book had been published and resulted in publication of a number of articles on the problems associated with application of the game theory to construction technology and management (e.g. Zavadskas *et al.* 2005 or Turskis *et. al.* 2006, etc.).

There are quite a few books and articles in the world dealing with the game theory. However, they are mostly written by mathematicians. Therefore, the emphasis is mainly placed on theoretical application of the game theory. Moreover, people who are not specialists in mathematics can hardly grasp the main idea and assess the scope of applications of this theory. Compared to the number of theoretical studies of the game theory, the cases showing its practical application are insufficient. In spite of great significance of this theory, it is being slowly introduced in practice.

The considered monograph addresses the problems associated with practical application of the game theory, particularly, in the area of construction technology and management. Moreover, the essential data on theoretical issues are also provided. The book provides an opportunity for the reader to get acquainted with the game theory and to know more about the main methods used in this theory and their advantages. Furthermore, it allows the reader to understand the basic principles of mathematical model construction and the existing limitations and to consider the main application areas of the game theory.

Construction technology provides wide opportunities for applying the game theory. The problems and tasks of construction technology and management are diverse. However, the main optimization requirements are aimed at achieving the best results in technological and economic development of enterprises. The authors offer a lot of particular optimization criteria, e.g. the shortest time of construction, the highest labour productivity, the lowest costs, the shortest idle time, the lowest consumption of materials, etc. One of the most significant construction technology problems is the choice of the best construction alternative. The authors offer a number of solutions to these problems related to the selecting of the construction site, methods of construction and mechanisms as well as the evaluation of manufacturing methods and organization solutions, etc.

The authors highly rate the fact that the typical problems of construction technology and management may be solved by applying zero sum game of two persons.

The authors suggested new formulas of data normalization for both maximizing and minimizing values. The dimensionless values obtained meet the requirements for the game theory matrix compiled for solving construction technology problems.

A great advantage of the monograph is that all major methods of the game theory considered in the work are implemented using the computer programs of decision support system LEVI 3.0. The application of the system, operational modes of the programs and maintenance instructions are described in the book. In addition, different normalization methods are suggested both for maximizing and minimizing values. In the monograph, the capabilities of the system LEVI 3.0 are demonstrated in solving practical construction technology problems, such as increasing the profitability of construction investments, selecting commercial building site, evaluating the alternatives of constructing service stations for automobiles and trucks, etc. The list of references in the book numbers about 300 scientific publications on the game theory. The main game theory concepts, methods and computer programs intended for solving the problems considered in the monograph, as well as those encountered in other areas, are described.

Since the publication of the monograph, the authors have written a number of articles on the problems of the game theory, reflecting new ideas and presenting new results obtained in its practical application. These are just a few examples: Zavadskas and Turskis (2008), Zavadskas and Kaklauskas (2007); Peldschus and Zavadskas (2005), Antuchevičienė *et al.* (2006), Zavadskas *et al.* (2005), Peldschus (2005).

Later, the author of the book Zavadskas and Brauers (University of Antwerp, Belgium) published a special issue of the journal *International Journal of Management and Decision Making* (2007, Vol. 8, No. 5/6,) in the publishing house Inderscience Enterprises Ltd, Geneve, Switzerland on the topic 'Normalization in decision making methods', in which several articles of the authors of the considered monograph and their co-authors, focussing on the problems associated with the game theory (Zavadskas *et al.* 2007; Migilinskas and Ustinovičius 2007; Peldschus 2007; Vaidogas *et al.* 2007; Vaidogas and Zavadskas 2007), were included.

After reading the book some questions still remain unanswered: What is the contribution of each of the authors of the monograph? How and by whom was the decision support system LEVI 3.0 created? What do the parameters and variables found in various sections of the book (e.g. in the tables of 4.3 or 6.1) mean? These short-comings do not, however , diminish the merits of the monograph.

I think that the considered monograph supplemented with some new data taken from recent publications and with some corrections made should be issued as a second edition in Lithuanian or English.

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BOOK REVIEW

METHODS AND MODELS OF RESEARCH IN CONSTRUCTION PROJECT ENGINEERING

Reviewed book: Oleg Kapliński (Eds.). *Methody i modele badań w inżynierii przedsięwzięć budowlanych*. Polska akademia nauk, komitet inżynierii lądowej i wodnej, Warszawa, 2007 [Methods and Models of Research in Construction Project Engineering, *in Polish*].

Reviewer: *Prof. Dr Sc. Edmundas Kazimieras Zavadskas*, Vilnius Gediminas Technical University, Lithuania, *edmundas.zavadskas@adm.vgtu.lt*

Editor: Oleg Kapliński

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Title: METHODY I MODELE BADAŃ W INŻYNIERII PRZEDSIĘWZIĘĆ BUDOWLANYCH [Methods and models of research in construction project engineering]

Subtitle: Collected text collated and supervised by Oleg Kapliński
Studia z zakresu inżinierii, NR 57
[Monograph of Engineering Science, NR 57]

Year: 2007

Publisher: Polish Academy of Science – Civil Engineering Committee, Warsaw

Volume: 415 pages

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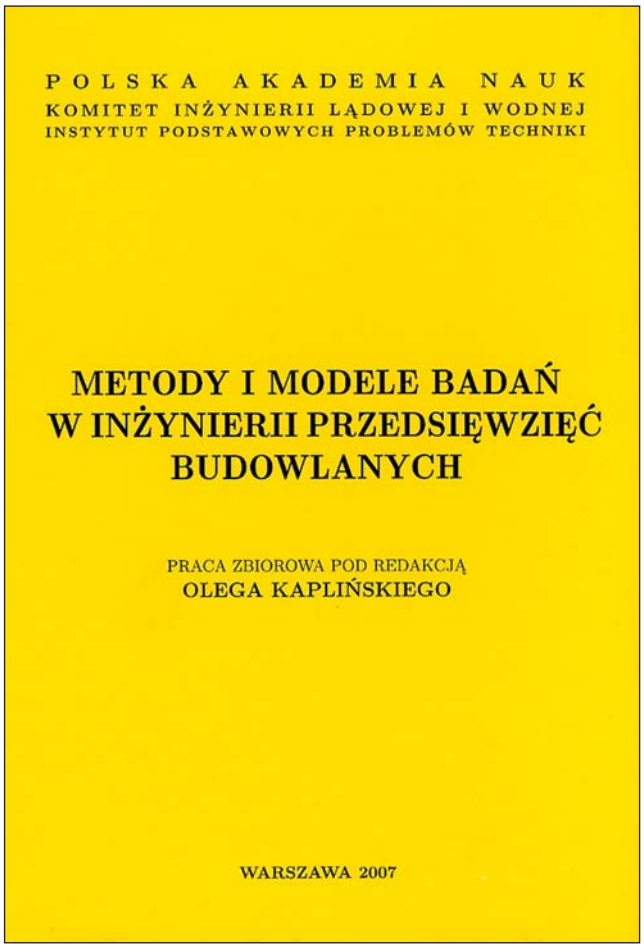

The book under review has been written by members of the Construction Management Section of the Civil Engineering Committee of the Polish Academy of Science.

Having read the text, I can say that it is an extensive synthesis of some interesting PhD and post-doctoral dissertations, written by the members of the Section, focusing on the area of modelling processes and construction projects.

It is a collaborative work; there are 16 co-authors from different academic centres in Poland, i.e., from Warsaw, Lublin, Cracow, Wrocław, and Poznań. The co-ordination and scientific edition of the work was entrusted to Prof. O. Kapliński from Poznań University of Technology, who had been granted a Honorary Doctorate by VGTU. It so happens that I personally know not only the co-ordinator, but also the majority of authors of the work in question, because a major part of the team of authors are regular members of the Lithuania-Poland-Germany colloquiums (1986–2007), where they present current research and, first of all, consult their PhD and post-doctoral dissertations. The large majority of authors participated in "Modern building materials, structures and techniques" conferences held in Vilnius. Some of the authors' work was published in Lithuania (2001–2007), for example in *Journal of Civil Engineering and Management* (Kapliński *et al.* 2002; Hejducki 2003; Jaskowski and Sobotka 2004; Hejducki and Rogalska 2004; Hola 2004; Kozniewski and Orlowski 2003, 2005; Sobotka and Charnigowska 2005; Kapliński and Janusz 2006; Marcinkowska and Rejment 2006; Hola 2007; Rogalska and Hejducki 2007, Schabowicz and Hola 2007, Kaplinski 2008), *Technological and Economic Development of Economy* (Fojud and Konarzewski 2001; Meszek 2001, 2004; Janusz and Kapliński 2006; Thiel 2006; Konarzewska and Konarzewski 2006; Meszek and Polewski 2006). Some academic achievements of Polish colleagues have been already reviewed by me and partners in scientific articles, including those published in *Statyba* (Zavadskas and Kaklauskas 2001), *Podium* (HTWK – Leipzig) (Kaklauskas *et al.* 2005), *Foundations of Civil and Environmental Engineering* (Poland) (Kapliński *et al.* 2004), and *Technological and Economic Development of Economy* (Lithuania) (Peldschus *et al.* 2006). I have completed a detailed review of Polish research on construction management in the article entitled *An overview of the problems related to research in construction engineering, management and economics in Poland* (Kapliński and Zavadskas 2002). The research reviewed there has now been extended by the Section team of authors into such areas as construction projects, project management and, most importantly, modelling of construction projects.

In view of the above, I think that the reviewed text presents the most recent developments, universal approaches and solution methods in the area of research, organisation and planning of generally conceived processes and construction projects in Poland. It is a monograph which can provide the Reader with instruments (research methodology) but, primarily, indicate methods and research areas. It is a review of different work sharing one aspect: all chapters relate to modelling of either the entire lifespan of a construction project or its specific phases.

What makes the book outstanding is indication (and separation) of three following issues: Research problems and areas; Methods and models of research; Technical applications. Their synthesis has been presented in Chapter 1, nevertheless the essence presents itself in every consecutive chapter.

To some extent, it also influences the layout of the text which is quite long – 415 pages.

The list of contents is as follows:

1. *Introduction to the monograph (O. Kapliński)*
2. *Construction project engineering (T. Kasprowicz)*
3. *Scheduling in construction industry production (R. Marcinkowski)*
4. *Modelling and financial analysis of construction projects (A. Kosecki)*
5. *Life-cycle analysis of a product developed within the framework of a construction project (A. Fojud)*
6. *Sensitivity analysis of logistic decisions (A. Sobotka)*
7. *Identification and complex risk assessment method in construction project implementation (D. Skorupka)*
8. *Application of evolutionary methods in scheduling construction projects (P. Jaskowski)*
9. *Artificial neural networks in construction project engineering (J. Biernacki)*
10. *Construction projects and processes perceived as fuzzy sets (J. Konior)*
11. *Multifactor modelling on the example of labour consumption and cost analysis of structural corrugated steel plate structure assembly (L. Janusz)*
12. *Multicriterial decision aid in planning (T. Thiel)*
13. *Expert systems as engineering operations support (J. Szelka, Z. Wrona)*
14. *Virtual organization model for a construction project (A. Sobotka, S. Biruk, P. Jaskowski)*
15. *Integrated 4D modelling and monitoring for construction projects (A. Sikorski)*

The text falls into three distinct parts.

The first part is a review of problems, presenting the object of research, as well as construction projects engineering, scheduling, modelling, and financial analysis

of projects, full life-cycle of an object, and some issues of logistics. Those areas are covered by chapters 1–6. More detailed chapters follow, including those discussing methods of risk identification, evolutionary methods, neural networks, fuzzy set applications, multifactor modelling. Those areas are covered by chapters 7–11, which constitute Part 2. Part 3 includes elements of decision aiding and virtual modelling. Those areas are covered by chapters 12–15. In my opinion, the borderline between specific chapters (of the three parts of the book) is not strict, as the discussed problems overlap.

I must say that each of the chapters presents fundamental problems and research areas, basing on original research methods and models, as well as presents clear links to engineering applications. What is important in this monograph is that the examples quoted in the chapters are authors' own original examples, not borrowed from foreign bibliographical sources. Moreover, all chapters end with methodological remarks, or remarks referring to software.

The core of the text, in accordance with the presented assumptions, is limited (in spite of its length) to modelling and research models. The text is not extended into the issues of company management, as this can be the subject of a separate monograph. I would like to say here that the problems of research and models can not be separated from issues of economy. In this context, I must stress that economy is present in the book, and not only in the basic chapter, namely *Modelling and financial analysis of construction projects* (Chapter 4), but in each chapter (for instance, while discussing an example, or selecting an optimisation criterion, or assessing an operational option). This aspect of the monograph is particularly impressive.

What is most important for the reviewer and, indeed, for the reader, is to be able to assess models presented in the chapters of the book. The problem is that it is quite difficult to give an univocal classification of those models. Referring to classifications that had been presented in other texts they may not always be adequate for a given situation, conditions, or while discussing a type of problem, especially in construction industry. Quite clearly, there is a number of criteria used in classifying models, and those we come across most commonly are: attributes, ways of description of how models work, characteristics of steps that had been taken. For obvious reasons, this type of approach is to be found in the revived monograph. The models presented in the text have been categorised as decision-related models and object-oriented models. In my opinion, the majority of models displayed in chapters 2–11 can be categorised into the former group, whereas those displayed in chapters 12–15 can be categorised into the latter. A specific type of models presented in chapter 13 are the so-called logical models (which use *if-then* expressions). Undoubtedly, hybrid models (systems) are the future of construction industry, including, for instance, advisory systems using a combination of all models mentioned above. Moreover, it is easy to show which of the models can be categorised as so-called normative, and which fall into a descriptive category.

In my view it is better, in some cases, to use the classification of models in accordance with the so-called decision-related situations, and take into account the degree of uncertainty. The issues of risk have been discussed in a number of chapters, whereas one entire chapter was devoted to discussing fuzziness. I am also of the opinion that a uniform subordination of all chapters to such an approach may not be proper, because using different models depends also on the analysed phase of the investment process and on the decision maker (i.e., weather it s a viewpoint of the investor, or contractor of a construction project). A variety of approaches has been taken into account in the reviewed monograph.

The high opinion of the text cannot be blurred by some detailed remarks which, in my view, should be accounted for in further efforts of the team. I would suggest that, in future research, apart from RFID (Radio Frequency ID) authors take the GIS (*Geographic Information System*) into account in connection with the GPS (*Global Positioning System*). Using them jointly may produce an interesting effect in monitoring and controlling production in construction industry.

The book under review is in some ways connected to an earlier monograph entitled *Modelling of construction processes. A managerial approach,* by O. Kapliński (1997). Nevertheless, the earlier book focused on processes in construction, while the present one concentrates on a higher level, namely construction projects. There is neither repetition of subjects nor methods dealt with in the earlier text.

The reviewed monograph covers a vast area, presenting several decision-related models. What is new that is decision aiding, and object-oriented models including expert systems, and the so-called virtual approach.

Due to a largely original approach and a synthesis of construction project modelling knowledge, I would like to suggest that the authors have the text translated into English.

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