



EWG-ORSDCE

NEWSLETTER OF EWG ORSDCE DECEMBER 2016

ORSDCE - The OR in Sustainable Development and Civil Engineering Working Group of EURO
<http://www.orsdce.vgtu.lt/>

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Words of chairman

Dear Members of EWG-ORSDC, dear Friends,

This year we celebrate the thirty-year anniversary of scientific cooperation. Every colloquium from the first one held in 1986 and to the last had given the considerable contribution to the publication of research papers and books, development of research, preparing doctoral dissertations and for international recognition. During the years of cooperation more than one hundred scientists participated in the activities of colloquia and joined EWG-ORSDC. The cooperation resulted with very good results: written 57 scientific books; more than five hundred articles published in scientific journals; 13 professors defended a habilitation or passed habilitation procedure; 80 doctoral students defended doctoral dissertations in field of civil engineering; several scientific publications in by ScienceWatch.com were selected as Top cited and Hot articles in mathematics, engineering and business fields; a few European patents were the registered; different awards were received.

This issue of newsletter presents the overview of ORSDCE2016 International Workshop on flexibility in sustainable construction held on July 7-8 in Poznan, Poland. We would like to express the acknowledgements to the organizers of event for warm welcome and perfectly organized event.

Newsletter presents also this year achievements and forthcoming events. In year 2017 EURO Working Group "OR in Sustainable Development and Civil Engineering (ORSDC)" will organize invited session in the field "OR for Development and Developing Countries" in forthcoming 21st Conference of the International Federation of Operational Research Societies (IFORS), that will be held in 17-21 July, 2017 in Quebec, Canada. The papers presented in this session are welcome for publishing in scientific journals: [Technological and Economic Development of Economy](#), [Journal of Civil Engineering and Management](#), [Journal of Business Economics and Management](#) and [International Journal of Strategic Property Management](#).

You are also welcome to participate in following conferences organized by EWG- ORSDCE members:

- 2nd International Joint Conference on Innovative Solutions in Construction Engineering and Management – Flexible Approach, that will be held in May 24-26, 2017, in Poznan - Kolobrzeg, Poland;
- The Ninth International Structural Engineering and Construction Conference (ISEC-9), that will be held in Valencia, Spain July 24-July 29, 2017;
- 16th Lithuanian-German-Polish colloquium and 6th meeting of EURO working group Operational Research in Sustainable Development and Civil Engineering (May 24, Poznan, Poland);
- 2nd International Workshop on flexibility in sustainable construction, which will be held in May 25-26, 2017 in Kolobrzeg, Poland.

Congratulations on all your achievements and best wishes for future activities.

With my best wishes, Yours sincerely,
Edmundas Kazimieras Zavadskas, Chair of EWG-ORSDC

Forthcoming Events



21st CONFERENCE

of the International Federation of Operational Research Societies

The 21st Conference of the International Federation of Operational Research Societies

July 17-21, 2017

Quebec, Canada

The 21th triennial conference of the International Federation of Operational Research Societies (IFORS, the umbrella organization comprising ALIO, APORS, EURO and NORAM) will take place in Québec City (Canada). IFORS 2017 will take place in the Convention Centre, conveniently located in the heart of the World Heritage city. Tourist attractions, restaurants and Québec City's nightlife are at close proximity of this meeting place which was declared the world's best convention centre in 2006.

The conference aims at bringing together operational researchers from around the globe to discuss the full spectrum of topics in OR, with a particular emphasis on the theme "OR/Analytics for a Better World".

All researchers, academics, practitioners, and students interested in all branches of operational research are invited to participate to IFORS 2017 by submitting an abstract, or organizing a session or a stream of sessions. IFORS 2017 is an exciting international forum and a great opportunity to meet new and old friends and colleagues from all over the world!

Oral presentations will be organized in parallel sessions. Authors can present only one paper at the Conference. Submission invited on, but not limited to, the following areas:

- *Behavioural Operational Research*
- *Constraint Programming*
- *Continuous Optimization*
- *Control Theory & System Dynamics*
- *Data Science, Analytics*
- *DEA, Performance Measurement*
- *Decision Analysis, Decision Support Systems*
- *Discrete Optimization, Mixed Integer Programming*
- *Applications of OR*
- *Energy, Environment, Climate*
- *Financial Modelling*
- *Game Theory, Mathematical Economics*
- *Graphs, Telecommunication, Networks*
- *Location, Logistics, Transportation, Traffic*
- *Metaheuristics, Matheuristics*
- *Multiple-Criteria Decision Making and Optimization OR for Development and Developing Countries*
- *OR in Education, History, Ethics*
- *OR in Health and Life Sciences*
- *OR in Industry, Software for OR*
- *OR in Natural Resources*
- *Production Management, Supply Chain Management*
- *Revenue Management, Pricing, Managerial Accounting*
- *Risk Analysis and Management*
- *Scheduling, Timetabling, Project Management*
- *Simulation, Stochastic Programming and Modeling*
- *Soft OR, Problem Structuring Methods*

Important dates:

Opening of abstract submission	November 1st, 2016
Registrations opening	January 16, 2017
Deadline for abstract submission	February 10, 2017
Review period	February 10 to March 10, 2017
Authors notification	March 10, 2017
Deadline of the early bird rate for registration	April 15, 2017
Deadline of the regular rate for registration	May 31, 2017

More information: <http://ifors2017.ca/>

Registration fees:

Registration type	Early bird registration Before or on April 15, 2017	Regular registration From April 16, 2017 to May 31, 2017 inclusively	Late registration After May 31, 2017 and on-site
Regular	\$950 CAD	\$1,200 CAD	\$1,300 CAD
Student	\$400 CAD	\$400 CAD	\$400 CAD

*All prices are in Canadian dollars (CAD) - Taxes not included

Registration fees for Regular Registration or Student Registration include:

- Access to all scientific sessions
- Access to the tradeshow
- Access to the Welcome Cocktail
- Convention bag with documentation
- Coffee breaks
- Half-day tour on Wednesday, July 19, 2017

Submit your abstract (max 600 characters) on line:

<https://www.euro-online.org/conf/ifors2017/>



2nd International Joint Conference on Innovative Solutions in Construction Engineering and Management – Flexible Approach

May 24-26, 2017

Poznan - Kolobrzeg, Poland

- **16th Lithuanian-German-Polish colloquium and 6th meeting of EURO working group Operational Research in Sustainable Development and Civil Engineering. 75th Anniversary of Professor Oleg Kaplinski. May, 24. Poznan**
- **2nd International Workshop on flexibility in sustainable construction. May, 25.-26. Kolobrzeg**

We are pleased to invite you to the joint meeting of researchers and practitioners active in the field of construction management: 16th German-Lithuanian-Polish colloquium and 6th meeting of EURO working group OR in Sustainable Development and Civil Engineering. The 16th German-Lithuanian-Polish colloquium includes official celebration of 75th birthday of Professor Oleg Kaplinski at Poznan University of Technology. In parallel the 2nd International Workshop on flexibility in sustainable construction will be held on May 25 in Kolobrzeg. ORSDCE2016 Workshop on Flexibility in Sustainable Construction is the new annual event of the EWG-ORSDCE.

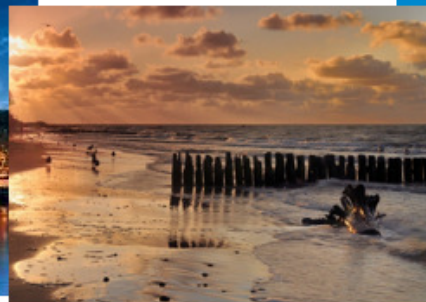
Venue – Poznan University of Technology, PL- 60-965 Poznan, 5 Piotrowo Str.

General aims of the conference and especially workshop:

- inspiration of young researchers to work
grace to keynote speakers
- discussion and development of new ideas and solutions with partners from industry,
- presentation of innovative projects given by the enterprises,
- knowledge bridge creation between academia – industry – PhD students,
- verification of the concepts in practice - case studies in progress

Topics of the conference:

flexible management; lean management; BIM; agile management; operational research; decision making; civil engineering; construction technology and management; sustainable development in civil engineering; buildings life cycle; qualification of human resources; real estate management; project management; quality management and special event: celebration of Prof. Dr.-Ing. habil. Dr. h. c. Oleg Kaplinski 75th birthday.



Special session

Prof. Dr.-Ing. habil. Dr. h. c. multi Edmudas Kazimieras Zavadskas

"Prof. Dr-Ing. habil. Dr h. c. Oleg Kaplinski great scientist and friend"

Prof. Dr.-Ing. habil. Dr. h. c. Friedel Peldschus

"Colloquium history and common results"

Prof. Dr.-Ing. Habil. Anna Sobotka

"Prof. Oleg Kapliński work for activation and consolidation of construction engineering and management society"

Honorary Committee

O. Kaplinski (Poland)
F. Peldschus (Germany)
E.K. Zavadskas (Lithuania)

International Programme Committee

G. Girmscheid (Switzerland)
J. Jasiczak (Poland)
A. Kaklauskas (Lithuania)
W. Maliene (United Kingdom)
J. Paslawski (Poland)
M. Radujković (Croatia)
A. Sobotka (Poland)
J. Šelih (Slovenia)
Z. Turskis (Lithuania)
L. Ustinovičius (Lithuania)
T. Vilutiene (Lithuania)
T. Mróz (Poland)
J. Tamošaitienė (Lithuania)

Organising committee

M. Gajzler (Poland)
T. Vilutiene (Lithuania)
Contact with us:
conference@ztiob.edu.pl
Phone: +48 61 665 2190
www.scfm.put.poznan.pl

Important dates

31.01.2017 – participation and abstract submission

15.02.2017 – confirmation of abstract acceptance

28.02.2017 – conference fee payment – 300 Euro/submission (incl. conference materials, lunch, coffee break, transportation)

24.-26.05.2017 – Conference

31.06.2017 – full text submission

Website: <http://www.scfm.put.poznan.pl/>



Scientific events 2016



ORSDCE2016 International Workshop on flexibility in sustainable construction

The ORSDCE2016 International Workshop on flexibility in sustainable construction was held on July 7-8, 2016, in Poznan, Poland.

The initiating members of the first colloquium, held in 1986, were: Prof. K. Fiedler (Leipzig Higher Technical School), Dr. F. Peldschus (Leipzig Higher Technical School), Prof. O. Kaplinski (Poznan University of Technology) and Dr. E. K. Zavadskas (Vilnius Civil Engineering Institute).

During the last colloquium held in 2015 in Poznan Prof. Oleg Kaplinski asserted "This colloquium should be for young scientists!" So keeping this new tradition the majority of members presenting their research during the workshop were young scientists – doctoral students presented their dissertations.

Presentations covered the topics of sustainability and flexibility in construction, logistics, lean management, BIM, LCA, agile management, innovative solutions, decision support systems, construction management, technological flexibility, flexible design of infrastructure, quality management, energy management, buildings life cycle, project management, build environment, social, technical, economical aspects of construction.

During the meeting prof. Richard de Neufville from Institute for Data, Systems, and Society, MIT presented his research on flexibility in engineering design via Skype.

The meeting of EWG-ORSDCE was sponsored by the [EURO](#) "Association of European Operational Research Societies" within [IFORS](#), the "International Federation of Operational Research Societies", civil engineering and construction companies: [ViaCon](#) Poland branch, [Walbet](#) and [Pekabex](#).

Sponsored by



Prof. Jerzy Paslawski says welcome and introductory words for participants of workshop.



EWG-ORSDCCE coordinator dr. Tatjana Vilutiene presenting activities and some initiatives of EWG members.



Doctoral student Jakub Piasny presenting his dissertation work on improvement of quality management systems.



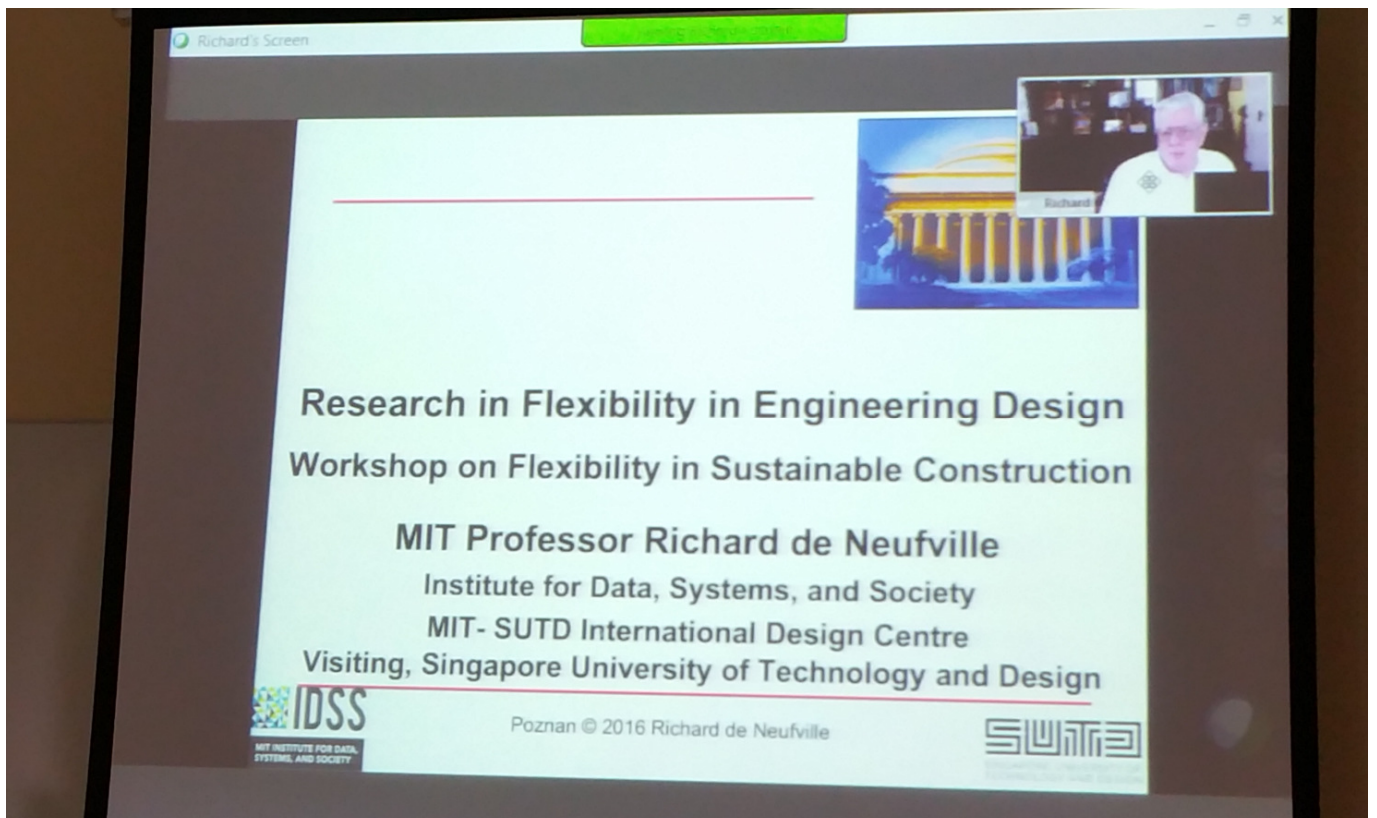
Doctoral student Piotr Nowotarski presenting his dissertation work on Lean management implementation in construction.



The sponsors of event “ViaCon” presenting the innovative solutions and flexible products of their company.

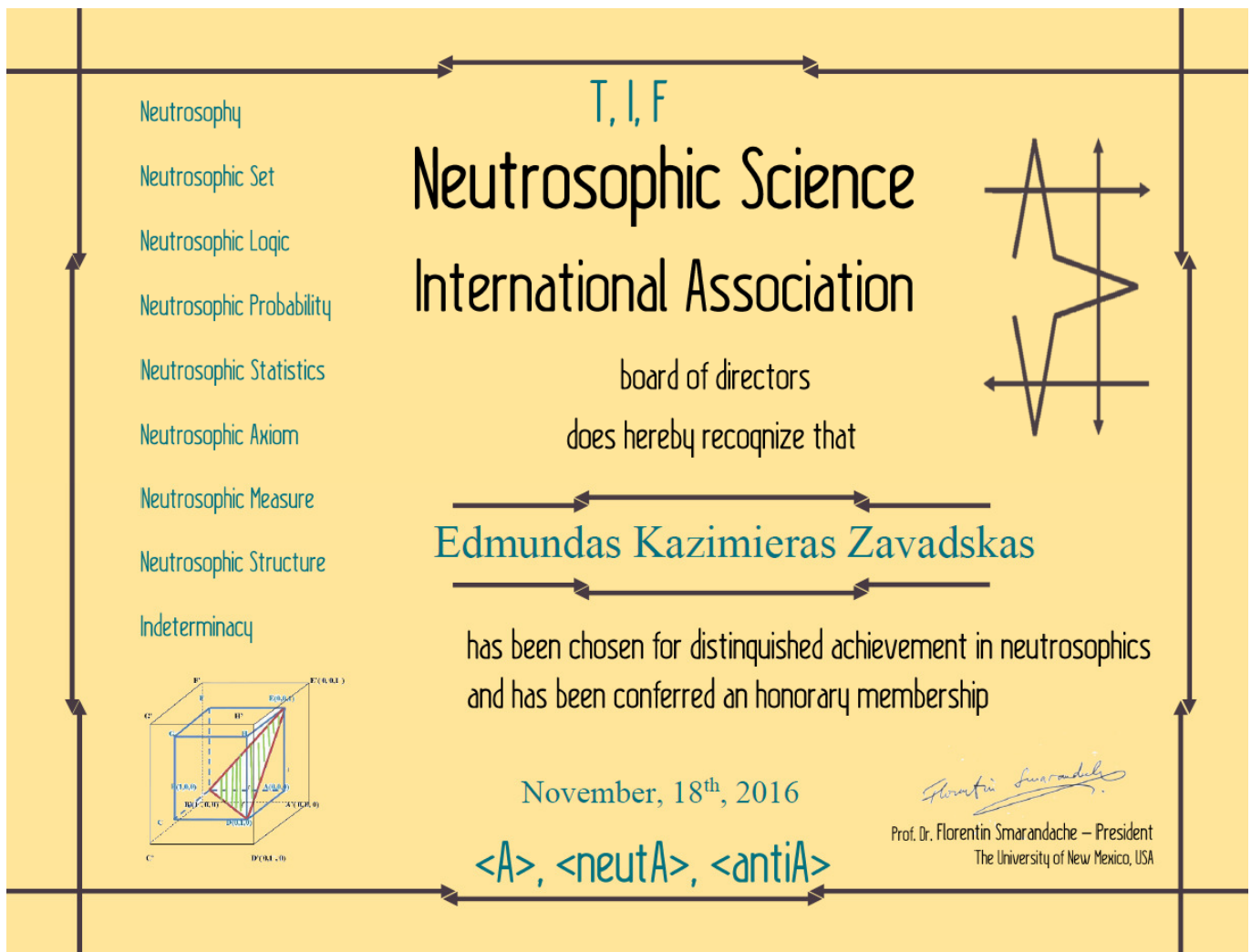


Prof. Richard de Neufville from Institute for Data, Systems, and Society, MIT presenting via Skype his research on flexibility in engineering design.



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International recognition Honorary Membership



This year the International Association - Neutrosophic Science issued a diploma to professor Edmundas Kazimieras Zavadskas (Vilnius Gediminas Technical University) for his published papers on neutrosophic set and logic. Professor has been chosen for distinguished achievements in neutrosophics and has been conferred an honorary membership. The recognition document is signed by Prof. Florentin Smarandache, University of New Mexico, Mathematics & Science Department, USA.

Neutrosophics is a new science. Many of the real life problems, such as civil engineering, social, economic, computer science, medical sciences, have imprecise data (or fuzzy), and all the real data is not necessarily accurate or deterministic due to the fuzzy nature of knowledge and inconsistency. Smarandache (1999) presented neutrosophic sets as a new branch of philosophy. He started to apply this philosophy for the decision-making and thus laid the foundation for a new branch of science designed for engineers, mathematicians, computer scientists, and many others, who set up and try a variety of mathematical models.

On behalf of all EWG-ORSCE community we congratulate honourable professor and wish him good luck in his further work!

Honorary Fellowship



This year the Vilnius Gediminas Technical University professor Edmundas Kazimieras Zavadskas was recognized for outstanding achievements in research field of grey systems and has been elected to Honorary Fellowship of the International Association of Grey Systems and Uncertainty Analysis.

In real life problems such as construction technology, management and other related areas the data available for decision-making is usually uncertain. Since the set of such values as, for example, the estimated duration of the construction, the cost of separate construction stage, the usage of resources, is not easy to determine exactly, grey research helps to realistically reflect the characteristics of problem and provide better results.

On behalf of all EWG-ORSDC community we congratulate honourable professor and wish him good luck in his further work!

Highly Cited Research



Staniūnas, M., Medineckienė, M., Zavadskas, E. K., & Kalibatas, D. (2013). To modernize or not: Ecological–economical assessment of multi-dwelling houses modernization. *Archives of Civil and Mechanical Engineering*, 13(1), 88-98. <http://dx.doi.org/10.1016/j.acme.2012.11.003>

Short summary. Nowadays modernization of multi-dwelling houses appeals greatly to those from landlords to politicians. The key problem that drives the issue is maintenance price, which mainly consists of two elements: (1) huge energy consumption during heating season, and (2) simultaneously rising greenhouse gas emissions from fuel combustion. Currently, most of the studies highlight particularly an economical aspect although on a global scale an ecological element becomes even more important. Hence the present paper combines both parts but mainly investigates an ecological compound, i.e. greenhouse gas emissions. Although it has been revealed that the binding targets of the Kyoto Protocol were very easily achievable for Lithuania, it is obvious that in the context of climate change a constant decline of emissions is necessary. Therefore, the paper seeks to establish an unconventional treatment of the Kyoto Protocol and its practical application on multi-dwelling modernization. The method aims at decreasing emissions significantly. The two scenarios have been investigated according to which modernization could help cut emissions by 8% or 20% of 1990 levels. Modernization scenarios were evaluated using multi-criteria decision making methods, i.e., COPRAS, WASPAS and TOPSIS according to which optimal option was revealed. The final results have revealed that a complete replacement of windows would help decline total emissions approximately by 30% and thus greatly fulfilled initial expectations.

Hybrid multiple criteria decision-making methods: a review of applications for sustainability issues

Edmundas Kazimieras Zavadskas, Kannan Govindan, Jurgita Antucheviciene & Zenonas Turskis

The concept of sustainability has become one of the most important objectives in many activities because of greater concerns for environmental protection and social responsibility. Sustainability is a natural subject of MCDM, because, by itself, it includes three sub-sets of criteria: economics, environmental, and social aspects. When analysing sustainable industries, a fourth sub-set of criteria – involving engineering and technological dimensions – is also important.

The paper of Edmundas Kazimieras Zavadskas, Kannan Govindan, Jurgita Antucheviciene & Zenonas Turskis (2016) aims at filling the gap and summarising publications related to developments and especially to applications of hybrid MCDM (HMCDM) methods, including those for supporting overall sustainability and for promoting their usage in modern decision-making. Because HMCDM approaches represent a relatively new and progressive trend, their abilities to join different techniques can assist decision-makers in handling miscellaneous information, involving stakeholders' preferences, interconnected or contradicting criteria, and uncertain environments.

This paper comprehensively reviews the literature related to hybrid MCDM models, abbreviated as HMCDM, on the basis of papers referred in Thomson Reuters Web of Science academic database. HMCDM involves four groups of decision-making methods or their combinations with other methods. Figure 1 depicts how the MCDM methods may be combined with methods to calculate the relative significance of criteria, as well as fuzzy sets or grey numbers.

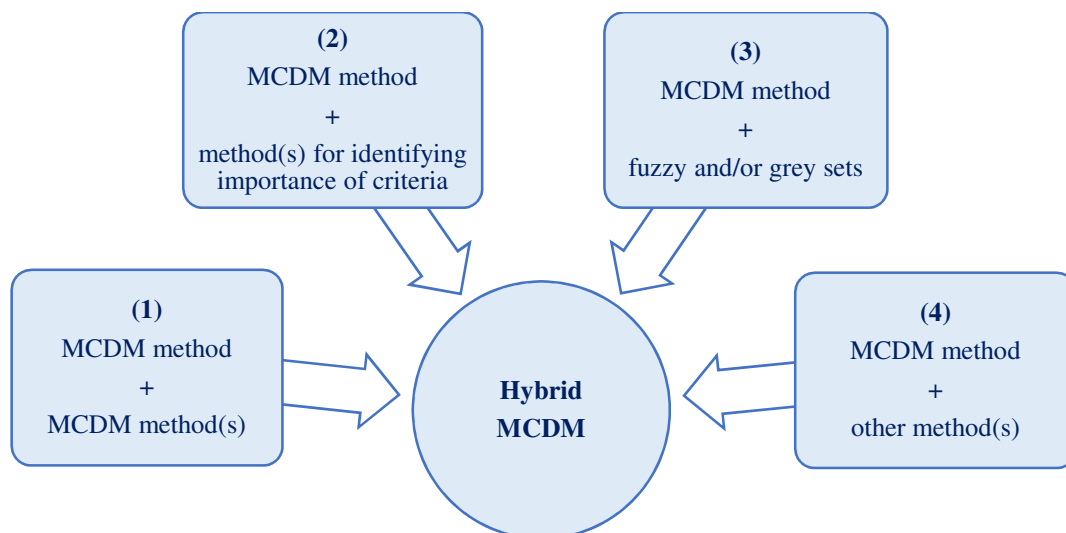


Fig. 1. Composition of hybrid MCDM

The research presents the results of analysis and answers the following questions:

- (1) *How are applications of the methods distributed, both by a period of publishing and by a country?*
- (2) *Which MCDM methods are used the most frequently in HMCDM?*
- (3) *In what research areas are HMCDM fruitfully applied?*

The extent of research in the area has increased rapidly over the last ten years, as can be observed in Figure 2. The number of publications on HMCDM increased from 1-2 papers per year from 1999-2006 up to 45 journal articles in 2015. 84 percent of articles in the area have been published during the last five years (2011-2015). Articles from the last two years (2014-2015) comprise 50 percent, respectively, of the total publication volume.

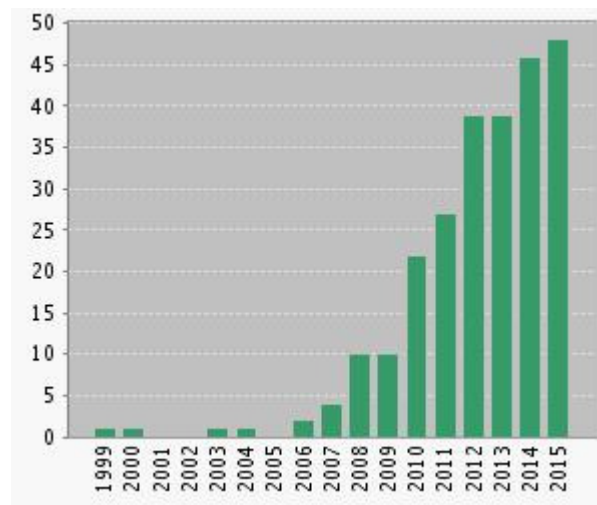


Fig. 2. Number of publications on the topic of hybrid MCDM (total: 251)

One of the findings of this paper is that Taiwan emerges as the leader in the number of publications. This is well illustrated on figures 3 and 4. Taiwan's dominant ranking is primarily due to the work of the famous Taiwanese scientist, Gwo-Hshiung Tzeng, who is the author of early publications on HMCDM methods. He popularised the analytic approach in the scientific community; he authored and co-authored a lot of papers, and his works are highly cited. His paper presenting a novel HMCDM model based on factor analysis and DEMATEL was cited 243 times which placed it in the top 1% of the most highly cited works in the academic field of engineering. Forty-seven of his papers on a subject of HMCDM are refereed in the WoS database, and those publications represent 42% of all Taiwanese papers on the subject. Tzeng's scientific school inspired other scientists to use his methods in their own research, and these methods eventually spread to other countries due to international scientific collaboration.

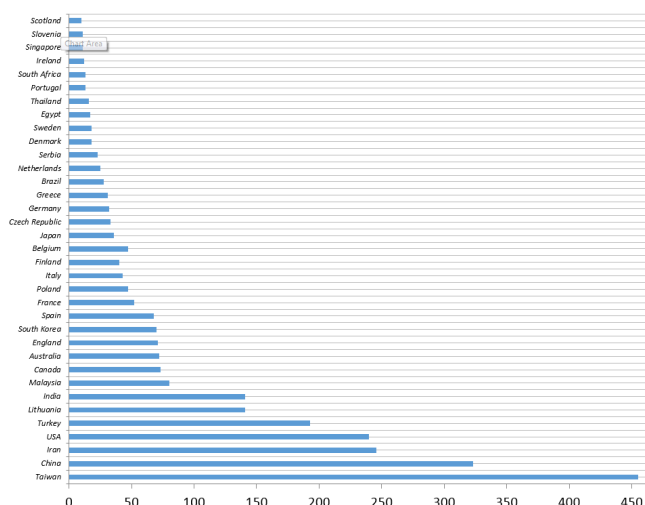


Fig. 3. MCDM application by country of origin (number of publications)

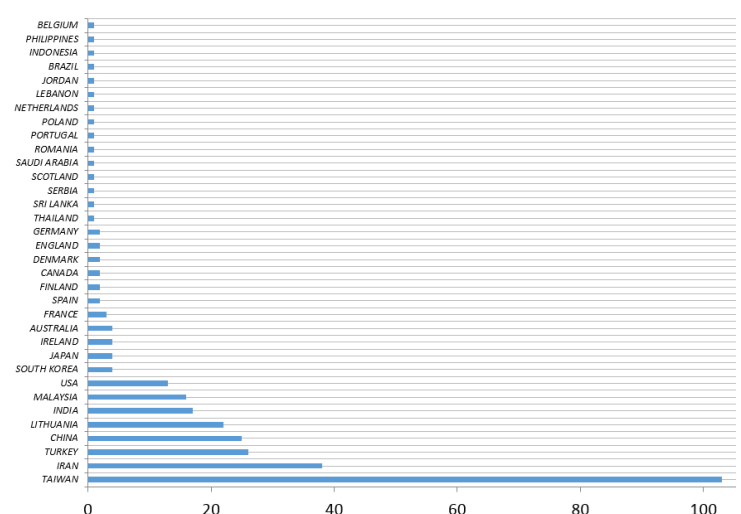


Fig. 4. Hybrid MCDM application by country of origin (number of publications)

After analyzing papers by topic, the papers were grouped into four groups by area of research (Figure 5). The problems solved and decision making methods applied in HMCDM are described in the paper following the classifications identified in the Figure.

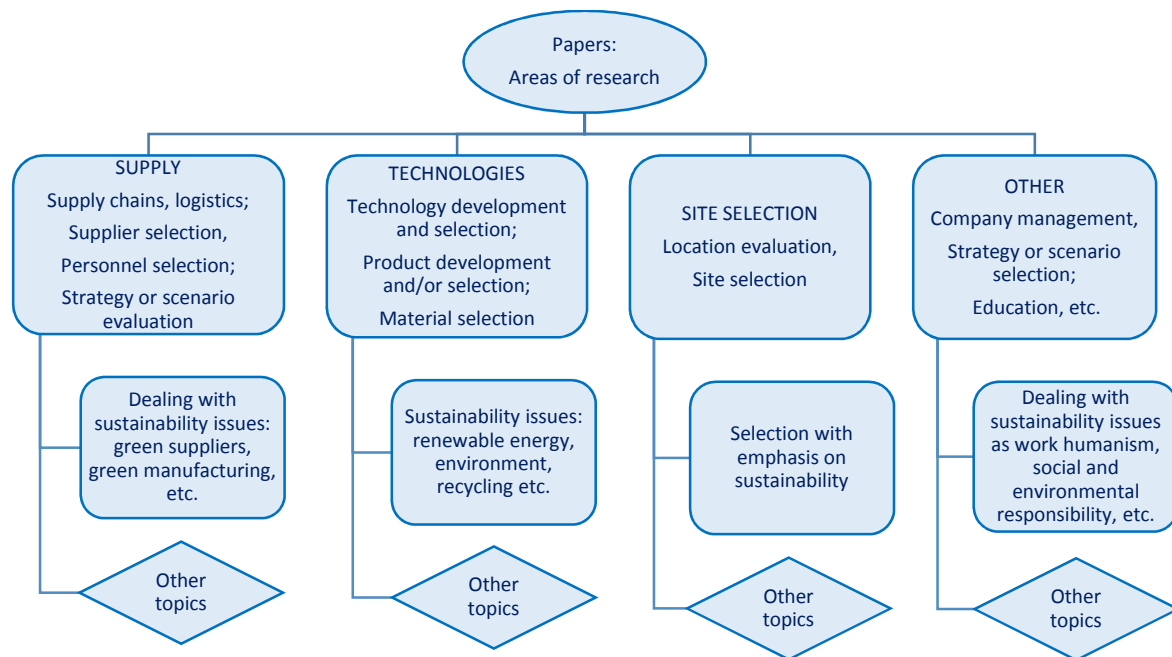


Figure 5. Research Areas of selected hybrid MCDM methods

When developing HMCDM methods, modular MCDM or extended MCDM methods have been used, and the most frequently used methods are ANP, DEMATEL, TOPSIS, AHP, and VIKOR. Of the top five most commonly cited methods, VIKOR receives 57 applications (48 in articles) and ANP, the highest, receives 110 in all documents (93 in articles). After the mentioned well-known methods, two newly developed approaches follow: COPRAS (with 14 citations, 13 in articles) and SWARA (10 citations, 9 in articles). The other methods were used in developments fewer than 10 times.

In summary, because individual MCDM methods can yield different rankings, selecting an appropriate method is a great challenge. It is therefore recommended to use a hybrid approach based on more than one method and to integrate those results for final decision-making.

In addition, the findings of the current research confirm that applications of HMCDM approaches for sustainability issues are gaining a higher recognition due to their ability to effectively assist decision-makers in handling complex information.

Read full text in article:

Edmundas Kazimieras Zavadskas, Kannan Govindan, Jurgita Antucheviciene & Zenonas Turskis (2016) Hybrid multiple criteria decision-making methods: a review of applications for sustainability issues, *Economic Research-Ekonomska Istraživanja*, 29:1, 857-887, DOI: 10.1080/1331677X.2016.1237302

Journal Special Issues related to decision-making methods and their applications

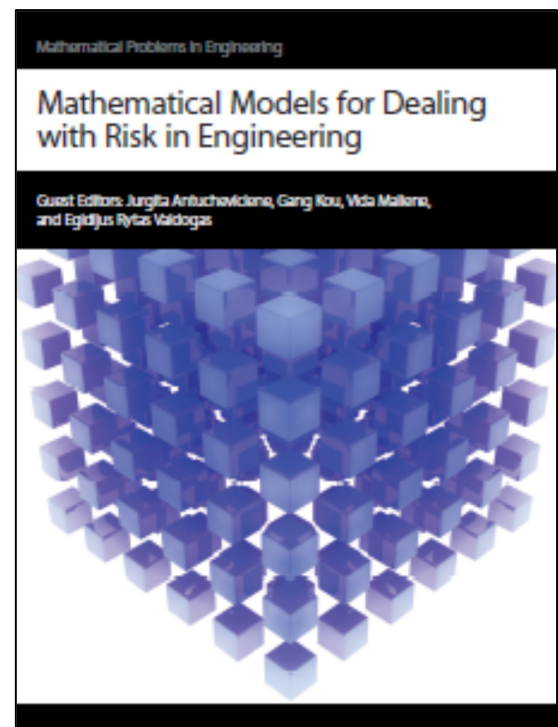
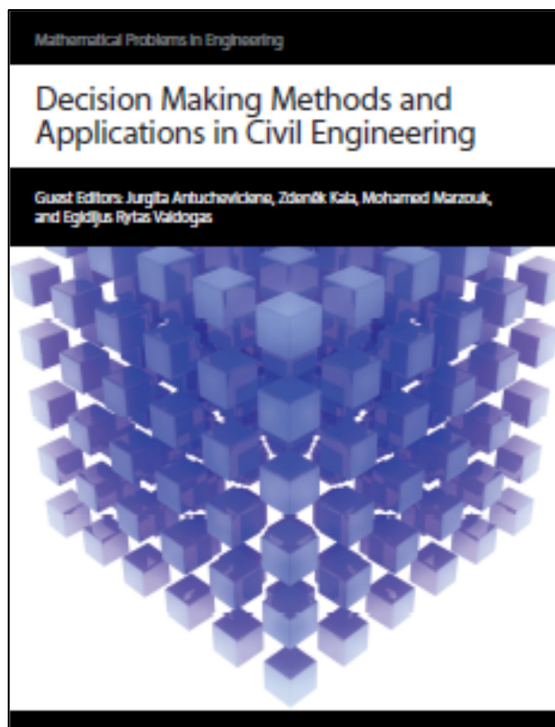
Jurgita Antuchevičienė, Egidijus Rytas Vaidogas

Hindawi Publishing Corporation invited members of EWG-ORSDCE to Guest Edit three special issues related to information management and decision-making.

Hindawi publishes peer-reviewed, Open Access journals across many areas of science, technology, and medicine, as well as several areas of social science. Hindawi's journals maintain the highest standards of peer review, managed by independent academic editors from prominent institutions around the world. Hindawi's journals are indexed in the leading abstracting and indexing databases, including the Web of Science and Scopus.

Two Special Issues, Guest Edited by EWG-ORSDCE members, were published in "*Mathematical Problems in Engineering*" in 2015 and 2016.

"*Mathematical Problems in Engineering*" is a peer-reviewed, Open Access journal that publishes results of engineering research carried out using mathematical tools. Contributions containing formulations or results related to applications are also acceptable. The journal applies rigorous peer-review and currently has an acceptance rate of 22%. The most recent Impact Factor for "*Mathematical Problems in Engineering*" is 0.644 according to the 2015 Journal Citation Reports released by Thomson Reuters in 2016.



The Special Issue „***Decision Making Methods and Applications in Civil Engineering***“ was published in 2015. See <https://www.hindawi.com/journals/mpe/si/267648/>.

International Guest Editors' team included two EWG-ORSDCE members: Lead Guest Editor Jurgita Antuchevičienė (Vilnius Gediminas Technical University, Lithuania) and Egidijus Rytas Vaidogas

(Vilnius Gediminas Technical University, Lithuania), also the team included Zdeněk Kala (Brno University of Technology, Czech Republic) and Mohamed Marzouk (Cairo University, Egypt).

The Special Issue aimed at providing recent developments about the decision-making in civil engineering. This field is vast and it plays an important role in the life of modern society. A very large number of decisions have to be made in the life cycle of buildings. Due to the increase of projects complexity, decision-making tools support all projects participants in their decisions. Decision-making methods can facilitate making these decisions in formal and not fully formal way. The present special issue provides numerous examples of such applications.

Articles published in this special issue prove that useful information for making construction related decisions can be yielded by methods that do not belong to a formal decision-making, for instance, sensitivity analysis, stochastic analysis, mathematical optimisation, occupational safety and risk assessment. Classical disciplines of engineering are also useful tool for facilitating decisions in civil engineering. However, all of these methods can be seen as means of providing input information for a formal decision-making.

The formal methods, with application of which this special issue is concerned to a large measure, were intensively developed and applied to various engineering systems in recent decades. They are known as methods of multiple criteria decision making (MCDM). Articles included in this issue show how to apply such MCDM methods as AHP, ANP and TOPSIS to making decisions related to construction industry and partially to transportation.

The problematic of decision-making cannot be resolved by means of MCDM alone. Sometimes intuition and sound engineering judgement is as useful for making decisions as formal mathematical methods. A necessary base for such a judgement are results of common engineering and sometimes of managerial analysis. Several articles of this special issue demonstrate how to solve problems of decision-making in this not fully formal way.

This special issue is composed of 17 articles. The presented special issue does not crystallise any special problem or methodological stream. It rather demonstrates how diverse can be problems of decision-making in the field of construction and related fields. Despite the certain randomness inherent in the final selection of manuscripts for publication, we think that the special issue could be interesting to all those who have to make decisions in the vast field of civil engineering.

The Special Issue „**Mathematical Models for Dealing with Risk in Engineering**“ was published in 2016. See <https://www.hindawi.com/journals/mpe/si/162542/>.

International Guest Editors' team included even three EWG-ORSDCE members: Lead Guest Editor Jurgita Antuchevičienė (Vilnius Gediminas Technical University, Lithuania), Egidijus Rytas Vaidogas (Vilnius Gediminas Technical University, Lithuania) and Vida Maliene (Liverpool John Moores University, United Kingdom). In addition, the team included Gang Kou (Southwestern University of Finance and Economics, China), a famous researcher in the field of multiple criteria decision-making and data mining.

The Special Issue aimed to provide recent developments dealing with risk in various fields of engineering. Risk is a ubiquitous phenomenon of modern society. The concept of risk is variously understood and used in engineering, economics, earth and social sciences.

In engineering, risk is commonly divided into speculative risk of potential economic losses or gains and non-speculative or pure risk related to damaging phenomena, such as failures and accidents of physical objects as well as disturbances in computer networks and damage to information systems. Currently, the assessment and management of pure risk is a well-established area with prospects of development and a number of unresolved problems.

Articles published in this special issue prove that risk assessment and management has many facets. Dealing with risk in engineering will require the application of a variety of approaches, ranging from sophisticated probabilistic and statistical models to straightforward engineering judgement and common sense decisions.

The management of risk calls for its assessment, and this in turn requires the quantification of the uncertainty of adverse events and consequences posed by each event. This is a standard, general scheme of risk assessment.

However, an application of this scheme will often require the solving of “local” problems, say, prediction of wind speeds, estimation of individual failure probabilities or analysis of failure propagation in safety-critical systems. Articles included in this special issue are devoted to a solution of such “local” problems. Most of them are from various fields of engineering and informatics; some are devoted to solving risk-related problems in management. A part of articles is devoted to problems of safety and security, whereas another part deals with the problem of reliability. Risk analysis and reliability assessment are closely related areas sharing many aims, principles and methodological tools. In that sense, articles of the special issue dealing with reliability can be considered as a contribution to risk assessment and management.

This special issue is composed of 14 articles. In summary, the issue does not seek to systematize the very diverse field of risk assessment and management in engineering. This special issue rather demonstrates how many-sided dealing with risk can be.

The third Special Issue is currently open for submissions at “*Complexity*” journal.

“*Complexity*” is a fully Open Access journal produced under the Hindawi and Wiley brands. It is a cross-disciplinary journal focusing on the rapidly expanding science of complex adaptive systems. The purpose of the journal is to advance the science of complexity. Articles may deal with methodological themes; also, papers treating applications in any area of natural science or human endeavour are welcome, and especially encouraged are papers integrating conceptual themes and applications that cross traditional disciplinary boundaries.

The most recent Impact Factor for “*Complexity*” is 3.514 according to the 2015 Journal Citation Reports released by Thomson Reuters in 2016.

The title of the proposed Special Issue is “***Managing Information Uncertainty and Complexity in Decision-Making***”. See <https://www.hindawi.com/journals/complexity/si/513462/cfp/>.

Today’s real-world problems involve multiple data sets, some precise or objective and some uncertain or subjective. Managing uncertainty is a prerequisite to effective problem solving and decision-making in complex systems. A wide range of statistical and non-statistical decision-making models has been proposed in the literature to model complex systems under uncertainty. In addition, hybrid decision-making models are quickly emerging as alternative methods of choice for modelling

complex systems under uncertainty. Accordingly, we invite authors to submit original research articles that propose formal decision-making methods to both describe and rationalize the process of decision making in complex systems under uncertainty. Potential topics include, but are not limited to managing information uncertainty in complex systems by means of statistical methods such as probabilistic approaches and simulation-based methods; non-statistical methods such as fuzzy set theory, rough set theory, possibility theory, or fuzzy neural networks; and hybrid multiple-criteria decision-making methods using interval-valued fuzzy sets, intuitionistic fuzzy sets, or neutrosophic sets.

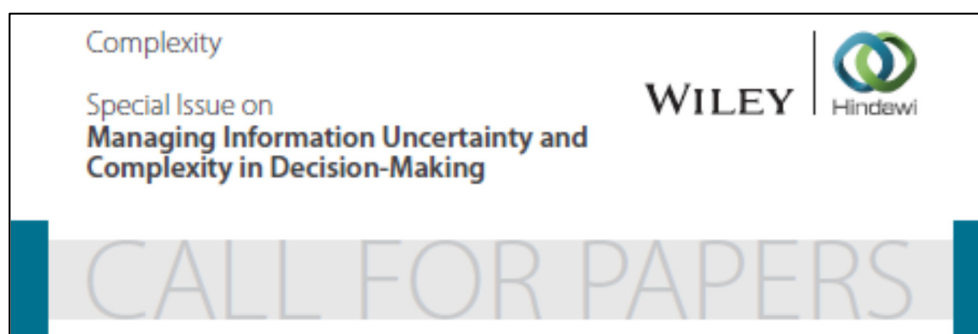
Guest Editors: Jurgita Antuchevičienė, Vilnius Gediminas Technical University, Vilnius, Lithuania; Madjid Tavana, La Salle University, Philadelphia, USA; Mehrbakhsh Nilashi, Universiti Teknologi Malaysia, Johor, Malaysia; Romualdas Baušys, Vilnius Gediminas Technical University, Vilnius, Lithuania.

Manuscript Due

April 28, 2017

Intended Publication Date

September 15, 2017



New scientific papers

The list presents papers co-authored by the members of EWG-ORS DCE and published in 2016 only in journals with IF.

Čereška, Audrius; Podvezko, Valentinas; Zavadskas, Edmundas Kazimieras. Operating characteristics analysis of rotor systems using MCDM methods. *Studies in Informatics and Control*. Bucharest : National Institute for Research & Development in Informatics. ISSN 1220-1766. Vol. 25, iss. 1 (2016), p. 59-68.

Čereška, Audrius; Zavadskas, Edmundas Kazimieras; Cavallaro, Fausto; Podvezko, Valentinas; Tetsman, Ina; Grinbergienė, Irina. Sustainable assessment of aerosol pollution decrease applying multiple attribute decision-making methods. *Sustainability*. Basel : MDPI AG. ISSN 2071-1050. Vol. 8, iss. 7, 586 (2016), p. 1-12.

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International projects in process

No.	Programme	Project	Short code	Date from - to	Responsible person (project manager)
1	Life Long Learning (LLP)	Collaborative Action towards Disaster Resilience Education	CADRE	2013-2016	Prof. Habil. Dr. Artūras Kaklauskas
2	Intelligent Energy – Europe (IEE) programme	Students Achieving Valuable Energy Savings	SAVES	2014-2017	Prof. Habil. Dr. Artūras Kaklauskas
3	Intelligent Energy Europe (IEE)	Initiative to boost continuing or further education and training of craftsmen and other on-site construction workers and systems installers in the building sector http://www.buildupskills.eu/	Build Up Skills ENERGOTRAIN	2014-2016	Assoc Prof Dr Tatjana Vilutienė

PhD Dissertations defended during 2016

Name of doctoral student	Title of dissertation	Year	Scientific supervisor
Marius Reizgevičius	Multi-Stage Assessment of BIM Technologies Efficiency	2016	Prof. Dr. Habil. Leonas Ustinovičius
Donatas Aviža	Multi-Purpose Selectonovation of an Optimal Thermal Insulation Layer for Building Envelopes	2016	Prof. Dr. Zenonas Turskis

Short review of defended dissertations

	Multi-Stage Assessment of BIM Technologies Efficiency Marius Reizgevičius 2016 Scientific supervisor: Prof. Dr. Habil. Leonas Ustinovičius
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Research object. The dissertation investigates BIM (Building Information Modelling) technology efficiency.

Aim and Tasks of the Work. The main aim of the thesis – to suggest effective multistage model for assessment of BIM technologies. Author of the thesis evaluates BIM technology efficiency by analyzing the construction sector. Also, the evaluation and justification of the effectiveness of 4D CAD using multi-criteria analysis is made. The need of BIM technologies for design company is evaluated and return on investment of BIM technology program is suggested.

Research methodology. During preparation of the thesis foreign and Lithuanian scientific publications, researches, construction company data, laws, regulating construction and design, building regulations, construction law, BIM standards have been analyzed. An experimental evaluation has been performed, also questionnaires, regression analysis, data organization, graphical data representation have been carried out. The decision-making method and multiple criteria analysis for assessing the effectiveness of 4D have been used. Also for doctoral thesis preparation informative publications of a variety of institutions in the construction industry, Lithuanian and foreign institutions statistical reports have been used. Technical information of BIM program producers, the various reports, return of investment calculation methodology have been examined.

Defended Statements.

1. The developed multi-stage assessment of BIM technologies efficiency model allows to assess each participant's role and level of implementation of BIM technology to design company.
2. The integration of building information model to the design sector companies creates new challenges, barriers. BIM integration for companies could bring not only profit, but also new problems. Implementation of BIM technologies to small design companies in Lithuania is an expensive and complicated process, and return on investment time is long.
3. Proposed ROI of BIM calculation method "ROI MR" allows to practically check design companies return on investment of BIM programming of any size design company in Lithuania and abroad.

The scope of the work. The thesis comprises an introduction, three chapters, general conclusions, list of references, list of publications by the author on the subject of the dissertation and two annexes. The introductory part presents the researched problem, relevance of the thesis, the research object,

formulated aim and objectives, scientific novelty of the thesis and defended statements. Closing remarks of the introduction introduce presentations given by the author at conferences as well as publications, and the structure of the dissertation. The first chapter discusses the value of BIM in the construction sector. BIM technologies influence for job efficiency and 4D model theoretical aspects are evaluated. Theoretical multilevel assessment of BIM technologies for design company is presented. The chapter closes with conclusions and revised objectives of the thesis. The second chapter provides the evaluation and justification of the effectiveness of 4D CAD using multi-criteria analysis. The experiment of 4D performance evaluation is made, 2D and 4D models are compared using statistical analysis, the effectiveness of these models is evaluated by using multi-attribute decision analysis methods. Research of BIM use in building engineering studies is discussed. The third chapter presents the return on investment evaluation of BIM technologies for the design company. There is established calculation method "ROI MR", which evaluates return on investment of BIM program for the first year. "Autodesk Revit" ROI and the author's proposed "ROI MR" calculation methods are compared.

Approval of the thesis. Eight scientific articles were published on the topic of the dissertation, one of which – in peer-reviewed journal of Thomson Reuters Web of Knowledge (ISI Web of Science), two – in ISI Proceedings; four – in other foreign and Lithuanian peer-reviewed publications, one – in proceedings of Lithuanian scientific conference.

Practical value.

The results may be useful for companies making micro-level decisions related to BIM technology implementation and application for company's activities. Results of the thesis research used in macro level can be useful for united BIM system formation and implementation, also for digitizing the construction sector in the individual country level. The results of the research may have a significant influence on both the micro-level and macro-level decisions related to the introduction of innovations in the construction sector, which will directly and indirectly affect both the other economy sectors, and technology, social and humanitarian fields development.



Multi-Purpose Selectonovation of an Optimal Thermal Insulation Layer for Building Envelopes

Donatas Aviža
2016

Scientific supervisor: Prof. Dr. Zenonas Turskis

Research object. The building envelopes' optimal thermal insulation layer selection problem is investigated and multi-attribute assessment system in order to solve this problem is applied in the present thesis.

Aim and Tasks of the Work. The main object of this thesis is to propose building envelopes' optimal thermal insulation layer multi-purpose selectonovation integrated decision making model and its algorithm as well as to adapt to the model which is in the process of creation the available proper quantitative multi-attribute decision making methods and to propose their combinations in order to determine an effective thermal insulation layer for building envelopes.

Research methodology. The preparation of this paper is based on the foreign and Lithuanian researchers' publications, investigations, Certification of energy of performance of building. In order to create a system of criteria various information sources of institutions were used. In order to substantiate practical application of multi-attribute integrated decision making model algorithm multi-attribute decision making methods were used (SAW, COPRAS, TOPSIS), as well as expert

assessment, COPELAND method for summarizing of results, modelling of scenarios, comparison of obtained calculation results and synthesis.

Defended Statements.

1. Multi-purpose selectonovation integrated decision making assessment is one of possible effective methods to ascertain optimal thermal insulation layer for building envelopes, global costs and payback period, taking into account the type of energy source, economic assessment scenarios and climatic data.
2. Decision making system based on multi-attribute methods may be used effectively to assess the effectiveness of envelopes heating or to solve task with big quantity of data and when the search for best decision is based on many purposes.
3. Proposed integrated model allows to create decision support systems which assess optimal heating option during the design and investment planning phases.

The scope of the work. The thesis consists of the following parts: introduction, three chapters, general conclusions, references, the List of scientific publications by the author on the subject of the thesis and annexes. The Introduction reveals the investigated problem, relevance of the thesis and the object of research. It describes the purpose, the tasks and scientific novelty of the paper, provides the defended statements. The structure of the dissertation, author's publications and conferences presentations are provided at the end of the introduction. Chapter 1 reviews literature and scientific investigations on the subject of the thesis. The empirical investigations of building energy performance assessment and optimal pricing are reviewed. The problems in foreign countries and in Lithuania related with the subject of the thesis are introduced. A survey of multi-attribute decision making methods and analysis regarding their applicability in case of solving the problem of thesis are presented. At the end of the Chapter the conclusions are formulated and the tasks of thesis are specified. Chapter 2 introduces theoretical model of multi-purpose selectonovation integrated decision making (MSIDM) system. The empirical investigation of climate influence on the thermal insulation layers is presented, the methodology of building envelopes coefficients of heat transmission, heat loss and calculation of savings is defined. Rational multi-attribute assessment methods combinations were proposed which are suitable to solve the analysed task. Chapter 3 presents MSIDM model practical application for the assessment of selection of the detached residential building envelopes optimal thermal insulation layer and represents the comparison of the obtained results.

Approval of the thesis. Twelve scientific articles were published on the subject of this thesis, three of them were peer-reviewed by the cited journals from database Thomson Reuters Web of Knowledge (ISI Web of Science), eight articles were presented in the proceedings of scientific conferences and one article – in the other peer-reviewed publication.

Practical value.

The results of investigations may be useful to designing companies, audit companies and construction companies. Multi-attribute assessment algorithm was proposed, selectonovation simulation program was created to assess effective thickness of thermal insulation layer of building envelopes, global costs, and payback periods. More effective using of thermal insulation products and investments may be promoted after practical application of proposed multi-purpose selectonovation model.

Editor's comments

Dear EWG-ORSDCE members, dear friends,

Thank you for all valuable contributions to EWG-ORSDCE activities, common initiatives and research papers.

Next year all members of EWG-ORSDCE are welcome to participate in the 21st Conference of the International Federation of Operational Research Societies that will be held in Quebec, Canada, July 17-21, 2017. You are also invited to participate in The 16th Lithuanian-German-Polish colloquium and 6th meeting of EURO working group Operational Research in Sustainable Development and Civil Engineering, which will be held May 25-26, 2017 in Poznan, Poland and in The 2nd International Workshop on flexibility in sustainable construction, which will be held in May 25-26, 2017 in Kolobrzeg, Poland.

On behalf of the Editorial Board of EWG-ORSDCE Newsletter
Tatjana Vilutienė

EWG-ORSDCE Newsletter Editorial Board: Edmundas Kazimieras Zavadskas, Tatjana Vilutienė