



Proceedings of the EWG-DSS 2016 International Conference on Decision Support System Technology (ICDSST 2016)



**An EWG-DSS Conference with a Theme on DSS Addressing
Sustainability and Societal Challenges**

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**Proceedings
of the
2016 International Conference on
Decision Support System Technology**

***with a Theme on DSS Addressing
Sustainability and Societal Challenges***

**Plymouth, UK
23-25 May 2016**

**Editors:
Shaofeng Liu, Boris Delibašić
Isabelle Linden, Festus Oderanti**

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Dean's Welcome Message Faculty of Business University of Plymouth

Professor Nikolaos Tzokas



Colleagues

On behalf of the Faculty of Business at the University of Plymouth, I am delighted to welcome you all to Plymouth for the 2016 International Conference on Decision Support System Technology (ICDSST 2016).

Effective organisational decision making requires, among other things, a clear ability to navigate through vast amounts of data and a strong sense-making capacity.

Easy to say hard to put into practice...

Supporting our students and managers in the development of skills and competencies underpinning a systems thinking approach and a well informed and confident decision making is at the centre of our pedagogy. Therefore practices and technologies associated with Decision Support Systems play a significant role in our research and learning environment.

It is a great honour to be hosting you this year and I look forward to facilitating the invaluable dialogue among academic researchers and market professionals that give rise to new and exciting approaches and technologies for making decisions.

I wish you a wonderful time at the conference in Plymouth!

Preface

This Proceedings presents the abstracts of all accepted papers and posters of the 2nd International Conference on Decision Support System Technology (ICDSST 2016) held in Plymouth, UK, during May 23rd to 25th, 2016, with the main theme “Decision Support Systems Addressing Sustainability and Societal Challenges”. This event is organized by the Euro Working Group on Decision Support Systems (EWG-DSS) in collaboration with University of Plymouth, UK.

The EWG-DSS series of International Conference on Decision Support System Technology (ICDSST), starting with the ICDSST 2015 in Belgrade, were planned to consolidate the tradition of annual events organized by the EWG-DSS in offering a platform for European and International DSS Communities, comprising academic and industrial sectors, to present state-of-the-art DSS research and developments, to discuss current challenges that surround decision-making processes, to exchange ideas about realistic and innovative solutions, and to co-develop potential business opportunities.

The scientific topic areas of ICDSST 2016 include:

- *DSS for health, demographic change and well-being*
- *DSS for food security, sustainable agriculture and forestry, and bio-economy*
- *DSS for marine and maritime and inland water research*
- *DSS for secure, clean and efficient energy*
- *DSS for smart, green and integrated transport*
- *DSS for sustainable construction and architecture*
- *DSS for climate action, environment, resource efficiency and raw materials*
- *DSS for inclusive, innovative and reflective societies*
- *DSS for secure societies – protecting freedom and security of the world and its citizens*
- *DSS for business sustainability, innovation and entrepreneurship*
- *DSS for lean operations, reverse logistics and sustainable supply chain management*
- *DSS for green marketing management and new product/service development*
- *DSS for human resource/leadership management and organisational ethics*
- *DSS for socially responsible accounting, finance and banking management*
- *DSS for economics sustainability and regional/ international development*
- *Innovative decision making approaches/methods and technologies*
- *Big Data analytics for solving societal decision making issues*
- *Knowledge management and business intelligence*
- *Decision making in modern education*

This wide and rich variety of topic areas allowed us, on the one hand, to present a collection of innovative solutions to real decision making process in a range of domains, on the other hand, to highlight the main trends and research evolution in DSS. This Proceedings edited by EWG-DSS and Local Organisation Committee has considered contributions from a large number of submissions which were rigorously

reviewed, maintaining EWG-DSS' long established reputation and standards of high quality. Each paper/ poster was reviewed by at least two internationally known experts from the ICDSST 2016 Program Committee comprising 79 scholars and practitioners from 28 countries. Therefore, through a two-stage review process, 52 papers and 3 posters were accepted, of which abstracts are included in this EWG-Proceedings.

We would like to thank many people who have greatly helped the success of this Proceedings. First of all, we would like to thank EWG-DSS to give us the opportunity to edit the Proceedings for the ICDSST 2016. Secondly, we highly appreciate the help from University of Plymouth Library for providing us with the ISBN number that is used for the publication of this Proceedings with a unique ID. Thirdly, we would like to thank Graduate School of Management and Faculty of Business at University of Plymouth for providing us a fantastic venue and all necessary facilities for the Conference. Fourthly, we need to thank all the authors for submitting their state-of-the-art work to be considered for the Proceedings. All accepted papers and posters are of extremely high quality. Finally, we wish to express our gratitude to the reviewers, who have voluntarily helped with the evaluation and improvement of the papers and posters at their business time of the year.

We believe that this Proceedings has made a high quality selection of well-balanced and interesting research papers and posters addressing the conference main theme. We hope the readers will enjoy the publication!

The Editors:

Professor Shaofeng Liu, University of Plymouth, UK


Professor Boris Delibašić, University of Belgrade, Serbia




Professor Isabelle Linden, University of Namur, Belgium

Dr Festus Oderanti, University of Plymouth, UK

ICDSST 2016

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EURO Working Group on Decision Support Systems

The EWG-DSS is a Euro Working Group on Decision Support Systems within EURO, the Association of the European Operational Research Societies. The main purpose of the EWG-DSS is to establish a platform for encouraging state-of-the-art high quality research and collaboration work within the DSS community. Other aims of the EWG-DSS are to:

- Encourage the exchange of information among practitioners, end-users, and researchers in the area of Decision Systems.
- Enforce the networking among the DSS communities available and facilitate activities that are essential for the start-up of international cooperation research and projects.
- Facilitate the creation of professional, academic and industrial opportunities for its members.
- Favour the development of innovative models, methods and tools in the field of Decision Support and related areas.
- Actively promote the interest on Decision Systems in the scientific community by organizing dedicated workshops, seminars, mini-conferences and conference, as well as editing special and contributed issues in relevant scientific journals.

The EWG-DSS was founded with 24 members, during the EURO Summer Institute on DSS that took place at Madeira, Portugal, in May 1989, organized by two well-known academics of the OR Community: Jean-Pierre Brans and José Paixão. The EWG-DSS group has substantially grown along the years. Currently, we count with over 300 registered members from around the world.

Through the years, much collaboration among the group members has generated valuable contributions to the DSS field, which resulted in many journal publications. Since its creation, the EWG-DSS has held annual Meetings in various European countries, and has taken active part in the EURO Conferences on decision-making related subjects. Starting from 2015, the EWG-DSS has established its own annual conferences, namely the International Conference on Decision Support System Technology (ICDSST).

The current EWG-DSS Coordination Board comprises seven experienced scholars and practitioners in DSS field: Pascale Zaraté (France), Fátima Dargam (Austria), Rita Ribeiro (Portugal), Shaofeng Liu (UK), Boris Delibašić (Serbia), Isabelle Linden (Belgium) and Jason Papathanasiou (Greece).

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ICDSST 2016 Invited Speakers

	<p>Professor Bob Young Loughborough University UK Co-ordinator of EU FP7 project FLEXINET</p> <p>Talk: Transforming manufacturing decision support through a holistic ICT approach</p>
	<p>Dr Hing Kai Chan University of Nottingham China Campus Editor of Industrial Management and Data Systems</p> <p>Talk: What factors affect decision-makers who set up environmental policies?</p>
	<p>Professor Steve Goodhew Associate Head of School University of Plymouth UK</p> <p>Talk: Decision making in sustainable construction</p>
	<p>Dr. Nilo T. Bugtai De La Salle University, Manila Philippines Project Leader, ICT for Health and Biomedical Equipment & Devices Philippine Council for Health Research and Development (PCHRD)</p> <p>Talk: ICT initiatives for sustainable healthcare decisions</p>

Abstracts of Invited Talks

Transforming manufacturing decision support through a holistic ICT approach

Professor R.I.M. Young
Loughborough University, UK

ABSTRACT

Competitive manufacturing industries are always striving to be “better, faster and cheaper” to stay ahead of their competition. This requires the ability to make successful business decisions against substantial time constraints and with limited high quality information. However, although ICT tools for manufacturing industry have advanced dramatically in recent years they do have drawbacks when it comes to providing the holistic capabilities that are critical to long-term competitive solutions. This presentation argues that businesses should be able to rapidly make high quality multi-perspective decisions. This requires access to the right people, access to the right information and support from the appropriate analysis tools. ICT solutions must therefore provide an environment where people can interact, where software tools can interact, and where information and knowledge can be shared. The results of the EU Factories of the Future FLEXINET project will be used to demonstrate how this is possible, linking a collaboration environment with business modelling tools, production network configuration tools and risk analysis tools, all interacting based on an underlying knowledge base which is itself designed to support interoperability across the range of supporting applications. This approach will be discussed in terms of its potential development to provide a common shared understanding that can be flexibly and dynamically applied to transform manufacturing industry in the next phase of the information revolution.

BIOGRAPHY

Prof Young is Professor of Manufacturing Informatics in the Wolfson School of Mechanical, Electrical and Manufacturing Engineering at Loughborough University in the UK. He has some 40 years experience in new product development and manufacturing engineering, working both in UK industry and in academia. His research is focused on exploiting advanced Information and Communications Technologies to aid multi-disciplinary teams of engineers in their decision-making through the provision of timely, high quality information and knowledge. Providing solutions to related problems is of critical importance to the knowledge economy and hence to the EU and worldwide business competitiveness. Prof Young works with a broad range of manufacturing companies from large multi-nationals in the aerospace and automotive sectors to more local manufacturing SMEs. In this latter area he is a director of TANet, an organisation aimed at providing support to the UK SME manufacturing sector. As well as working closely with industry, Prof Young is committed to developing effective information standards for manufacture. To that end he is deputy convenor of the international standards organisation working group concerned with “manufacturing process and management data”, ISO TC184 SC4 JWG8. Prof Young also leads a task group within the EU’s Virtual Laboratory for Interoperability or INTEROP-VLab. This group is focused on developing improved methods for Manufacturing Enterprise Interoperability.

What factors affect decision-makers who set up environmental policies?

Dr Hing Kai Chan

University of Nottingham, China Campus

ABSTRACT

Policy makers and general citizens are keen on protecting the environment. For example, in December 2015, 195 countries agreed on a legally binding global climate deal in Paris. In other words, there are lots of discussions about similar environmental regulations. That being said, whether or not the pressures regarding such regulations can positively improve firm performance at the end is unclear. If not, how companies can comply with the regulations, and in the meantime achieve profit or at least maintain a good efficiency? This empirical study aims to address this issue. More specifically, it is found that green product innovation is a mediating factor between the aforementioned regulatory pressures and firm performance. It is also found that environmental dynamism is a moderating factor of the above mediating relationship. This study helps decision-makers who set up the related environmental policies by taking the aforementioned factors into account.

BIOGRAPHY

Dr Hing Kai Chan is an Associate Professor in Operations Management. Prior to joining the Nottingham University Business School China in September 2014, he was a Senior Lecturer in the Norwich Business School, University of East Anglia in UK. He gained his PhD from the University of Hong Kong. Dr Chan has published over 100 academic articles and (co-)edited several special issues for reputable international journals. His publications appear in Production and Operations Management, European Journal of Operational Research, Decision Support Systems, various IEEE Transactions, International Journal of Production Economics International Journal of Production Research, among others. He has been the co-editor of Industrial Management & Data Systems, and has been an Associate Editor of IEEE Transactions on Industrial Informatics since 2014. Dr Chan also serves as an Editorial Board Member (or similar roles) in a number of journals such as Transportation Research Part E: Logistics and Transportation Review, Online Information Review.

Decision making in sustainable construction

Professor Steve Goodhew

University of Plymouth, UK

ABSTRACT

Energy use and our built environment are intrinsically linked. As our buildings use approximately 40% of the energy consumed in most societies the need to apply the principles of sustainable construction to affect genuine energy efficacy is paramount. However the procurement of buildings is a complex and varied process linking many parties/stakeholders, and offers a very different situation to the production of many more uniform products. Buildings that are designed built and operated to be energy efficient rely on good decisions, taken at an early stage. Good decision making needs to take into account the various opinions and interests that follow from the client, the designer, the construction team and finally the manager/operator/occupant.

This presentation takes the audience through a number of the tools that are available to support good decision making to reduce energy consumption in buildings within the realm of sustainable construction. Some examples of situations when decisions can be finely balanced are discussed.

BIOGRAPHY

Professor Steve Goodhew looks after the Environmental Building Group (EBG) and is part of a team that run a unique High Performance Building Masters course and three undergraduate degrees (Architectural Engineering, Building Surveying and Construction Management) at Plymouth University. The EBG in the form of building analysis and energy related work is currently responsible for £2M of funded research. Steve has authored a number of publications concerning sustainable construction, thermal imaging and buildings, natural building materials and in situ thermal measurements. A new book is to be released in the Summer of 2016, published by Wiley Blackwell entitled Sustainable Construction Processes: A Resource Text. Steve gained most of his insights into these topics through a Masters in Energy and Buildings at Cranfield University and a PhD involving the in situ thermal measurement of building materials at Plymouth University.

ICT initiatives for sustainable healthcare decisions

Dr. Nilo T. Bugtai

De La Salle University, Manila Philippines

ABSTRACT

BIOGRAPHY

Abstracts of Full Papers

Detectability based Prioritization of Interdependent Supply Chain Risks

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ABSTRACT

Supply chain risks must be assessed in relation to the complex interdependent interaction between these risks. Generally, risk registers are used for assessing the importance of risks that treat risks in silo and fail to capture the systemic relationships. Limited studies have focused on assessing supply chain risks within the interdependent network setting. We adapt the detectability feature from the Failure Modes and Effects Analysis (FMEA) and integrate it within the theoretically grounded framework of Bayesian Belief Networks (BBNs) for prioritizing supply chain risks. Detectability represents the effectiveness of early warning system in detecting a risk before its complete realization. We introduce two new risk measures and a process for prioritizing risks within a probabilistic network of interacting risks. We demonstrate application of our method through a simple example and compare results of different ranking schemes treating risks as independent or interdependent factors. The results clearly reveal importance of considering interdependency between risks and incorporating detectability within the modelling framework.

Keywords: Supply chain risks; risk registers; systemic; detectability; Failure Modes and Effects Analysis; Bayesian Belief Networks

A Decision Support System for Multiple Criteria Alternative Ranking Using TOPSIS & VIKOR: A Case Study on Social Sustainability in Agriculture

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ABSTRACT

TOPSIS and VIKOR are two well-known and widely-used multiple attribute decision making methods. Many researchers have compared the results obtained from both methods in various application domains. In this paper, we present the implementation of a web-based decision support system that incorporates TOPSIS and VIKOR and allows decision makers to compare the results obtained from both methods.

Decision makers can easily upload the input data and get thorough illustrative results. Moreover, different techniques are available for each step of these methods. A real-world case study on social sustainability in agriculture is presented to highlight the key features of the implemented system. The aim of this study is to classify and rank the rural areas of Central Macedonia in Northern Greece using a set of eight social sustainability indicators.

Key words: multiple attribute decision making, TOPSIS, VIKOR, decision support system, sustainable agriculture

Workload Reduction Through Usability Improvement of Hospital Information Systems - The Case of Order Set Optimization

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ABSTRACT

Order sets are a critical component in hospital information systems intended to substantially reduce physicians' physical and cognitive workload. They are time interval-clustered representations of multiple, relevant order items for the same clinical purpose that are administered to patients during their hospital stay (e.g. medications prescribed at hospital admission for a specific condition). In this paper, we develop a mathematical programming model, an exact and a heuristic solution procedure to minimize physician workload associated with prescribing order sets. We show theoretical properties of the problem and demonstrate how the model can be simplified for the minimization of physical instead of cognitive workload. In a case study using order data on Asthma patients with severe conditions from a major pediatric hospital, we compare the hospital's current solution with the exact and heuristic solutions on a variety of performance metrics at multiple levels of detail. Our computational results reveal that using an interval decomposition approach substantially reduces computation times and can solve the problem to optimality within minutes. Our physician workload analysis reveals that the exact approach reduces the hospital's current physical workload for these patients by 12% to 65% simply by allowing 1 to 5 order sets in each time interval, respectively. Similarly, cognitive workload can be reduced by 21% to 23%. Our optimal approach reveals a substantial optimality gap of heuristic order set optimization when physical workload is minimized, but vanishes when cognitive workload reduction is the objective. Finally, we have implemented a research prototype of this methodology with a graphical user interface that allows practitioners to compare current order set usage with optimal and heuristic order set optimization.

Keywords: Healthcare Information Systems; Health informatics/health information systems/medical IS; Analytical modeling; Heuristic

Updating Business Intelligence and Analytics Maturity Model for New Developments

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ABSTRACT

Recent developments such as real-time, social, predictive and cloud business intelligence and analytics (BI&A) introduce extra ways for organisations to obtain insight and business value from an expanded range of data. Organisations have struggled with the strategy, implementation, and measurement of their BI&A efforts, and a series of business intelligence maturity models (BIMMs) has been introduced to identify strengths and weaknesses of their BI&A situation, and assist remedial action. These BIMMs are however seen to be incomplete and outdated and do not accommodate recent BI&A developments. This study suggests how BIMMs should be modified to cater for these developments. Existing BIMMs were examined, and interviews conducted with BI&A professionals knowledgeable about BIMMs and recent BI&A changes. Findings suggested that existing BIMM dimensions should be modified in various ways to cater for the recent changes in BI&A. In addition, project management was identified as a new BIMM dimension.

Keywords: Business intelligence; maturity models; analytics; big data; decision support.

Data Analysis Supported Decision Making in Insurance Sector

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ABSTRACT

Big data is nowadays progressively turned into a valuable asset. The ability to produce insights from data, and exploit them into actionable opportunities has increasingly made a great impact on the industries. Thus, the organizations recognize the significant advantage of their enormous data and try to make sense of it. The insurance sector is concerned with many business problems of interest to the research community. By analyzing and gaining insights of their claim data and customers' claim patterns, claim costs or resources can be reduced and managed effectively as well as risks or fraudulent claims can be recognized and detected. Most importantly, the insights gained from the data can aid in decision-making process.

This paper presents a case study involving an independent insurance group Z, a small-medium insurance company who insures household appliances and gadgets in the UK. The research looks at existing claims, analyses the claim data, and figures out the claim patterns using a variety of techniques within the methods of data mining.

In the data analysis, it analysed trends and extracted insights from the claim data; what kind of a claim is driven by a certain set or combined set of factors such as the age of customer, what type of a claim that a customer tends to make. The analysis found that a BMC product (mobile phone) claim tends to be a customer who is younger than 35 years old and the claim tends to be made within 1 month of the policy being active. In the claim pattern analysis, the study used the Association Rule Mining with Apriori and R for finding patterns (rules) from the claim data. It was found that the younger (less than 35 years old) customers with claim type of LOST with unsuccessful result are highly associated with a Product BMC (mobile phone) claim.

The research gains better understanding of customer claim data, claim patterns, and enables to provide valuable insights to the insurance group Z, supporting decision-making process.

Keywords: Data Mining; Insurance Data Analysis; Case Study

Knowledge Management as an Emerging Field of Business Intelligence Research: Foundational Concepts and Recent Developments

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ABSTRACT

A number of prior studies have been conducted to assess the extent of progress within these stages in the BI area. Among them, a study of Eom [1] has provided bibliometric evidence that the decision support system has made meaningful progress over the past three and a half decades (1969-2004). The primary data for this study were gathered from a total of 498 *citing* articles in the BI/DSS area over the past eight years (2005-2012). This study, based on author cocitation analysis (ACA), presents two important findings. First, the empirical consensus of BI researchers reveals that the focus of business intelligence research is shifting to knowledge management and data mining. Second, since ACA is a supporting quantitative tool that must be used with further qualitative analysis of bibliographic data, we examined the foundational concepts of knowledge management provided by the most influential scholars and their most frequently cited publications

Keywords: Business Intelligence, decision support systems, data mining, knowledge management, informetrics, author cocitation analysis, multidimensional scaling.

A novel collaborative approach for business rules consistency management

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ABSTRACT

This paper presents an approach based on ontology and agents. The major objective is to automatically manage the consistency of business rules introduced by the experts during the capitalization of business rules process as part of a collaborative system dedicated to experts. The Evaluator agent is at the heart of our functional architecture, its role is to detect the problems that may arise in the consistency management module and provide a solution to these problems in order to validate the accuracy of business rules. It uses the knowledge represented in the domain ontology. We exploit the possibilities of TERMINAE method to represent the company's business model and manage the consistency of the rules that are introduced by business experts. The suggested approach treats here the cases of contradiction, redundancy, invalid rules, the domain violation and the rules never applicable. We conducted some experiments to test the feasibility of our approach.

Keywords: Business rules (BR), Business Rules Management System (BRMS), Collaboration, Consistency management, Multi-agents systems (MAS), Ontologies.

Workload Information Visualization as a Decision-Making Support: A Spatial Analysis of Public Health in the Northeast Region of Brazil

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ABSTRACT

Maternal mortality is a strategic indicator that describes a socio-political-cultural vision of Brazilian society and allows us to observe the inequities in underdeveloped areas. The use of indicators such as maternal mortality in public health interventions is increasingly required to meet the population's needs. Focusing on increasing complexity of the interaction between these socio-political and cultural factors, decision support systems (DSS) become increasingly requested to assist in decision-making in public policy. An interesting approach to DSS application in health public is through the use of geographic information systems (GIS), bringing out the idea of a spatial decision support system (SDSS). This paper describes a framework that uses GIS approach to support the public decision maker in identifying spatial clusters of mortality maternal. The analysed data were obtained from a retrospective epidemiological study about maternal deaths in the period from 2009 to 2015. The study results are comprehensive, considering several aspects involved in maternal mortality, which show inequalities in the risk of death of people between different municipalities of the state of Pernambuco, located in the Brazilian Northeast region. This approach will contribute to the improvement of data quality and can be used for planning actions seeking to reduce mortality maternal.

Keywords: Spatial Decision Support Systems. Decision Making. Public Health. Spatial Analysis.

E-Commerce Development Risk Evaluation Using MCDM Techniques

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ABSTRACT

Electronic commerce (EC) development takes place in a complex and dynamic environment that includes high levels of risk and uncertainty. This paper proposes a new method for assessing the risks associated with EC development using multi-criteria decision-making techniques. A model based on the analytic hierarchy process (AHP) and the technique for order of preference by similarity to ideal solution (TOPSIS) is proposed to assist EC project managers and decision makers in formalizing the types of thinking that are required in assessing the current risk environment of their EC development in a more systematic manner than previously. The solution includes the use of AHP for analyzing the problem structure and determining the weights of risk factors. The TOPSIS technique helps to obtain a final ranking among projects, and the results of an evaluation show the usefulness performance of the method.

Keywords: E-Commerce, Risk Analysis, Multi-Criteria Decision Making, AHP, TOPSIS.

How to support decision making of local government in prioritising policy menu responding to citizens' views: An exploratory study of text mining approach to attain cognitive map based on citizen survey data

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ABSTRACT

It has been on the political agenda for the local governments how to satisfy their citizens to enhance their commitment and contribution to the communities. Especially in this ageing population era with tight fiscal conditions, it is essential for the government to know the prioritised policy menu in realising citizen satisfaction. This study aims to explore an applicable system based on citizen survey result. In our study, following literature review, we conducted focus group discussions to explore citizens' willingness to participate in local policy design, which leads us to be convinced that some activated citizens are supportive to the local governmental policy decision. Based on this qualitative result, we tried to make a cognitive map which indicated which policy fields are prioritised by citizens. Throughout this procedure, we validate the feasible practice to support local governmental decision making based on the result of citizen survey.

Keywords: local government, citizen perception, citizen survey, text mining, cognitive map

SnowBall DSS: an ensemble Multi-Criteria Decision Support System encompassing cascading effects for disaster management

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ABSTRACT

The Fukushima Dai-ichi disaster has shown the importance of evaluating cascading effects in disaster management, as the impact of a triggering hazard may generate different sequences of events (event trees) that result in physical, social or economic disruption. SnowBall is a European research project¹ that aims at increasing the preparedness of the European Union to amplifying hazards in a crisis through foresight and decision-support tools. The SnowBall theoretical model proposes to assess the possible event trees generated by a triggering hazard in accordance with the conditional probability between two events. The probabilities are deduced from an ad hoc database and literature review, at global scale, and customization through experts judgement (elicitation), at local scale. The impact assessment of a single chain of cascading events is treated as a typical 'scenario analysis', considering the cumulative damage on the elements exposed and their distribution on the territory. A decision algorithm works on top of the event tree model and damage simulations on coupled grids and it is able to support the decision maker (DM) in comparing a set of mitigation strategies on the basis of their expected impacts and his/her priorities. The decision algorithm is based on two Multi-Criteria Decision Making algorithms, ELECTRE III and ELECTRE TRI (ELimination Et Choix Traduisant la Réalité). A single mitigation strategy is split into a set of different mitigation strategies, according to its position in the event chain. The algorithms then run without any ad-hoc modifications, producing a ranking and a class assignment among mitigation strategies. This approach supports the DM also in the choice of the best timing for the intervention, a crucial factor in a context where cascading effects are taken into account. The algorithm is based on an ensemble approach, which combines decisions over an array of possible impact scenarios, instead of only relying on the average impact scenario. In this way, the algorithm conveys the uncertainty about the effectiveness of mitigation strategies, through a set of ranking and class distributions. The results of the algorithm and of the models are stored in a common database and displayed in a dashboard, which enables the interaction with the user.

Keywords: Decision Support System, Multi-Criteria Decision Making, Disaster Management, Cascading effects, Cumulative damage, SnowBall project, Ensemble methods

Decision Support Tools: a Novel Classification

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ABSTRACT

Decision support tools are developing as rapidly as the evolution of Information and Communication Technologies that are used to design them. But no tools has been abandoned. This variety of tools presents an additional difficulty to the decision maker to choose the tool adequate to the problem to be solved. Hence the need for a new classification. Classification can help to organize and clarify knowledge associated to decision support tools, in order to facilitate to the decision maker the choice of the most appropriate tool for his needs.

This paper presents, in a first time, a brief review of existing classifications of decision support tools in the literature. These classifications are focused either on the number of users (individual, group, organizational), or on the architecture of tools (dominant component, functionalities, technologies and techniques), or on the phases of the decision making process supported by these tools. Most of these classifications did not put the decision maker at the center of interest. In a second time, this paper proposes a new classification of decision support tools that focuses on the decision maker. The proposed classification takes place in three stages. In the first stage, the tools are classified according to the phases of the decision making process. In the second stage, the tools are classified according to whether they help to improve the cognitive process of decision maker or that they help to understand the decision situation, and in the last stage, the tools are classified according to whether they handle data or knowledge.

In our future work, we will revisit this classification, to integrate the Information System as a decision support tool, given that one of the main features of the information system is the decision support.

Keywords: Decision support tools, Decision support, Decision making, Decision maker.

A Knowledge Based System for Supporting Sustainable Industrial Management in a Clothes Manufacturing Company based on a Data Fusion Model

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ABSTRACT

In this paper we propose a knowledge based system (KBS), based on smart objects and a data fusion model to support industrial management decision making applied to a clothes manufacturing enterprise. The management processes cover factory-production levels to higher decision-making levels. Therefore, the proposed KBS contributes to solving different kind of decision problems, including factory supervision, production planning and control, productivity management, real-time monitoring, and data acquisition and processing. The web access via different middleware devices and tools at different process levels, along with the use of integrated algorithms, decision methods, and smart objects, promote an optimized use of knowledge and resources. In this paper the proposed KBS is introduced and an example of its use is illustrated with an example of a clothes manufacturing resources selection, using the embedded dynamic multi-criteria fusion model.

Keywords: Knowledge based system, industrial management decision making, dynamic multi-criteria decision model, manufacturing resources selection.

An Operations Research-based Morphological Analysis to Support Environmental Management Decision-Making

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ABSTRACT

In this paper the authors present a meta-model aiming to support decision-makers that wish to know more about how to use systems models to cope with the integration of environmental concerns into the company strategy. This is made by using a General Morphological Analysis (GMA) to bridge the gap between Operations Research (OR) analysts, decision-makers and stakeholders, making all of them part of the problem structuring and formulation process, particularly in societal issues like the environmental ones. The novelty of this approach is two-fold: (i) there are no examples in literature of a GMA research that address a linkage between environmental practices, strategic objectives, and the integration of stakeholders in the decision-making process at the level of a company; (ii) there is no GMA that had covered all the phases of a decision-making problem (problem definition, problem analysis and problem solving) in such a context.

Keywords: General Morphological Analysis; Environmental Management; Strategic Decision-Making; Stakeholder Involvement.

Scaling Issues in MCDM Portfolio Analysis with Additive Aggregation

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ABSTRACT

This paper discusses a typically scaling issue, which can arise in the context of multicriteria (MCDM) portfolio analysis: the portfolio size effect. By analyzing previous application this issue may happen by the impact of an additive aggregation for the standard portfolio construction model. Thus, it has been shown that the scaling issue may arise even when baseline correction procedures are adopted and this paper suggests that additionally to the baseline adjustment, a ratio scale correction may be necessary, depending on the combination of values and constraints considered by the problem.

Keywords: Project portfolio. Portfolio scaling issue. Portfolio size effect. Baseline in portfolio.

Developing Innovative Tool to Enhance the Effectiveness of Decision Support System

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ABSTRACT

This research centres on Usability Evaluation Methods (UEMSs) with the aim of supporting developers' decisions in the use of learning resources in achieving efficient usable system design. The suggestion is made pertaining to a new usability evaluation model dEv (stand for Design Evaluation) with the objective to support decisions to overcome three key obstacles: firstly, the involvement of users in the preliminary stages of the development process; 2) developers' mind set-related issues as a result of either their lack of UEMS or the provision of too many; and 3) the complete lack of understanding surrounding UEMS importance. An experimental approach was applied in addition to a survey-based questionnaire in an effort to examining the issues pertaining to UEMS. Empirical works were carried out with system developers in order to test the dEv, the results of which have been presented from the empirical study to support various considerations, such as: system developers' decisions and their involvement in the earlier phases of the design of systems; the gathering of specifications and end-users' feedback; and enhancing usability evaluation learning capacity.

Keywords: Usability, UEMS learning resource, Evaluation methods, Usable system design, Decision making

Searching for Cost-Optimized Strategies: An Agricultural Application

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ABSTRACT

We consider a system modeled as a set of interacting components evolving along time according to explicit timing constraints. The decision making problem consists in selecting and organizing actions in order to reach a goal state in a limited time and in an optimal manner, assuming actions have a cost. We propose to reformulate the planning problem in terms of model-checking and controller synthesis such that the state to reach is expressed using a temporal logic. We have chosen to represent each agent using the formalism of Priced Timed Game Automata (PTGA) and a set of knowledge. PTGA is an extension of Timed Automata that allows the representation of cost on actions and the definition of a goal (to reach or to avoid). This paper describes two algorithms designed to answer the planning problem on a network of agents and proposes practical implementation using model-checking tools that shows promising results on an agricultural application: a grassland based dairy production system.

Keywords: Decision Support System, Temporal Planning, Optimized Planning, Timed Automata, Model-checking

Knowledge Sharing and Innovative Corporate Strategies in Collaborative Relationships: The Potential of Open Strategy in Business Ecosystems

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ABSTRACT.

Knowledge is a central resource in gaining competitive advantage. Sharing of knowledge between partners in collaboration has been an important research focus in the area of strategic management. In different collaborative structures, the determinants and capabilities knowledge sharing differ, as do the strategies employed, the positions taken and the roles played. The following conceptual work provides an insight into how knowledge is shared between partners, how knowledge is influenced by the partners' environment and their capabilities; depending the position they take and the roles they play.

Keywords: Networks, business ecosystems, competition, collaboration, knowledge sharing, open strategy.

Enhancing antenatal clinics decision-making through the modelling and simulation of patients flow by using a system dynamics approach. A Case for a British Northwest Hospital

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ABSTRACT

In the past 60 years, the maternal mortality rate in the United Kingdom has dropped considerably. However, the number of high-risk pregnancies including those complicated by pre-existing maternal health problems e.g. diabetes or lifestyle illnesses e.g. obesity has resulted in an increased demand on obstetric outpatient management of pregnancy at British National Health Service hospitals. In addition, patients also expect better access and convenient appointments in the antenatal clinic. Despite on-going work in these areas, long delays in clinic waiting rooms continue to be a great source of frustration for patients and staff. These delays have a considerable social cost to the economy and a financial cost to the health economy. Therefore, this paper considers a realistic study for supporting decision-makers in antenatal clinics in British northwest hospitals by using a system dynamics approach through causal-loop diagrams. The focus is to enhance the performance of the clinic, by understanding the flow of patients through a hospital clinic thereby aiming to reduce waiting times for patients.

Keywords: HealthCare, Decision-making, Operations Management, System Dynamics Simulation.

Fuzzy inference approach to Uncertainty in budget preparation and execution

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ABSTRACT

In recent times, diverse uncertainties in the global economic environment have made it difficult for most countries to meet their financial obligations. For example, according to statistics from European Commission, 24 out of 29 recorded European Economic Area member countries had budget deficits in 2014. Therefore through modelling and simulations, this paper proposes flexible decision support schemes that could be used in managing the uncertainties in budgeting. Rather than entirely relying on estimates of anticipated revenues (which are uncertain and difficult to predict) in government budgeting, the scheme proposes incorporating fuzzy inference systems (which is able to capture both the present and future uncertainty) in predicting the anticipated revenues and consequently, in proposing government expenditures. The accuracy of fuzzy rule base helps in mitigating adverse effects of uncertainties in budgeting. We illustrated the proposed scheme with a case study which could easily be adapted and implemented in any budgeting scenarios.

Keywords: Decision; budgeting; uncertainty; Wage negotiation; Fuzzy logic; Membership; Functions;

Business and IS alignment theories built on eGovernment service practice: an holistic literature review

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ABSTRACT

This paper investigates previous studies of business and information system (IS) alignment holistically in the context on developing strong working relationships between professionals from business and IS backgrounds in eGovernment and large business organizations, while examining alignment studies that allows the development of IS which is suitable, on-time and within budget. Alignment plays a vital role in the formation of dependent relationships between people from two different groups and the performance of alignment can be improved by developing an IS according to the stakeholders' expectations. The paper employs system theory to collect and analyse the data across the selected platforms. The results identify that alignment between business and IS departments remains a priority, and is of concern in different ways to different sectors which provides opportunities for future debate and research.

Keywords: strategic alignment, social alignment, cultural alignment, structural alignment, business modelling, information systems, e-Government.

Abstracts of Short Papers

A Web-based Forest and Natural Resources Decision Support System: SADfLOR

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ABSTRACT

In this paper, we present a forest management planning web-based decision support system (SADfLOR). The system enables remote visualization of ecosystem services potential supply values as well as of trade-off information. This is influential to evaluate the levels of achievement of various objectives in order to help users build strategic and sustainable forest management plans.

This system is being implemented in a web server system *apache*. The web development was done with the web programming languages: *HTML*, *CSS*, *PHP*, *JavaScript* and with the *PostgreSQL* as the database. The system's architecture includes web interfaces with a Geographic Information System module that enables the user to select the management area and check related information (forest inventory, soils, climate and topological data). The user may further add a new forest area, and upload its forest inventory, geographical and soil data. After the selection of the management impact area, the web based graphical user interface (wGUI) enables the user to define the species to consider in management planning and the type of model to use in the simulations. The wGUI enables the user to build the input files required by the stand-level simulator (standsSIM) that is incorporated within SADfLOR (Forest Management Approaches – FMA file, economic data file, consumables file and assortments file for each species). The wGUI may also be used to trigger the generation of single or multiple prescriptions (which are sequences of FMAs that may be applied to a stand over the planning horizon) and its storage in a prescriptions file. It may be used further to trigger the execution of the standsSIM module in order to generate the simulation output file to be input to the optimization and decision modules.

The latter requires further input that the user may design taking advantage of the wGUI. Specifically, the wGUI is designed to help the user build the management planning model, e. g. decision variables, objective functions and constraints (including spatial and flow constraints) The user may trigger the execution of the SADfLOR optimization and decision module. The latter includes mathematical programming routines as well as Feasible Goals Methods / Interactive Decision Maps routines. These routines provide proposals of management plans that may be assessed using geographical and alphanumeric information provided by the wGUI. Graphic analysis, innovative KPI's and management reports make the analysis and interpretation of solutions easy. The involvement and participation of stakeholders on SADfLOR's development was deemed as critical to guarantee the quality and usability of the system.

Keywords: Web-Based Decision Support System, Mathematical Programming, Multi-criteria Decision, Forest Simulator

Risk analysis for bank investments using PROMETHEE

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ABSTRACT

This article aims at analyzing financial investments from a risk point of view. The analysis is carried out by specifying, first, several financial operations typical of banking on a smaller scale, such as investing and extending credit and, second, several types of risk inherent in these activities. The risks are grouped into four criteria, operational risk, financial risk, management risk and external risk. The analysis is conducted using the PROMETHEE multi-criteria decision methodology. Professionals in risk management are trying to better appreciate the complexity of the financial activities under study, and have used complex models to do so, but nonetheless many risks are still not well understood. This article contributes to the risk analysis, delivering results that will help many financial institutions to improve the management of their financial operations, including micro-finance.

Keywords: MCDM, Risk Analysis, Bank Investment, PROMETHEE

A Recommender System based on MultiCriteria Aggregation

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ABSTRACT

Recommender systems aim to support decision-makers by providing decision advice. We offer multi-criteria decision recommendations based on a performance matrix and a partial order on criteria submitted by the user. Our method is to aggregate performance measures over all criteria based on inferences about preferences from the decision-maker's input. After reviewing some multicriteria aggregation operators, we present a recommender system that uses the Choquet integral of a fuzzy measure to determine a total ordering of the alternatives.

Keywords: Recommender System, Choquet Integral, MCDA

Supporting Public Organizations to Make the Do-Or-Buy Decision Following a Positive Deviance Approach

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ABSTRACT

The building permits process is a process that commonly within Europe is a municipal responsibility. It is a rather complex process because it comprises hundreds of activities, in a great variety of sequences. In 2015, five Dutch municipalities opened their data for the Business Process Intelligence Challenge (BPIC), hoping to get evidence-based insights about their process. One important issue concerns the outsourcing of some of the activities. This work tries to support this critical outsourcing decision.

Following the positive deviance paradigm that suggests that positive deviant cases could act as best practices, we apply process analytics to check to hypotheses: If process flows differ within the categories (positive, normal) of cases, and if flow differences can actually recommend which activities should be outsourced. Initial results suggest that our methodology can provide valuable decision support, yet current work is limited to performance-wise elements.

Keywords: Process analytics, Positive deviance, Graph partitioning, Public organizations

Integrating Big Data and Business Analytics in Supply Chain, Risk Management, and Healthcare

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ABSTRACT

This research tries to develop a framework that integrates big data and business analytics with applications in supply chain, risk management, and healthcare to create business value and to improve future performance. The term “Big Data” is used to characterize data sets that are large, diverse and rapidly changing. Big data require database management systems with capabilities beyond those seen in standard structured query language systems. The term “Business Analytics” refers to the skills, technologies, applications, and practices for continuous iterative exploration and investigation of past business performance to provide actionable insights. Business analytics focuses on developing new insights and understanding business performance based on data and statistical methods. The key word here is *integration* because the traditional business analytics such as statistical analyses and decision-making models are no longer effective and efficient due to huge size and unstructured nature of big data. In other words, the success of big data business analytics depends on how well big data from information technology perspective, such as text mining and NoSQL skills, is integrated with business analytics from quantitative reasoning perspective such as statistical analysis and predictive modeling. Specific emphasis will be on applications of big data business analytics in the field of supply chain management, risk management, and healthcare.

Keywords: Big Data, Business Analytics, Supply Chain, Risk Management, Integration

Performance Improvement in the Freight Transport Industry: Identification and Selection of ICTs in Product Service Supply Chain Diversification²

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ABSTRACT

Perhaps the most significant challenge faced by companies is how to ensure long-term sustainability. In the scientific literature, industrial and technological diversification is considered as one of the best methods for achieving this goal. Following the methodology designed by the authors for selecting the best industrial and technological diversification strategy, this work describes its application in the Service Supply Chains sector, specifically, in Freight Transport in-Product Service Supply Chains. The two main contributions of the paper are: (i) the construction of a technological shrub for ICTs in a freight transport sector company; and (ii) the multicriteria selection, based on the Analytic Hierarchy Process (AHP), of the best diversification strategy that can be incorporated by the company for improving competitiveness. The technological shrub is constructed in line with the main functionalities associated to the ICTs in the transport sector. The selection of the best diversification strategy utilises a ‘bottom-up’ approach. An AHP-KB-DSS is developed for the multicriteria evaluations contemplated during the stages of the diversification process.

Keywords: Performance Improvement, Diversification, Freight Transport Industry, ICT, Product Service Supply Chain, AHP-KB-DSS.

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Infrastructure network interdependence modelling for decision making in natural disaster situation

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ABSTRACT

In the context of natural disaster affecting infrastructure network, decision-making depends on existing interdependences among components. This paper proposes interdependent systems modeling approach for vulnerability analysis. We analysis the lack of existing models and proposed a model for interdependence and vulnerability. The decision process deriving from the vulnerability assessment is proposed.

Keywords: Vulnerability, Interdependence, Decision, Network, Infrastructure

A conceptual framework of knowledge networking and mobilization for lean supply chain decisions

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ABSTRACT

This paper focuses on knowledge networking and knowledge mobilization and how they are used in supporting decision making for lean supply chain management, aiming to reduce cost and waste. Based on the examination of literature, a conceptual framework is developed which allows knowledge to be transferred among different supply chain stages in order to achieve the lean concept. In order to define the conceptual framework, over 70 papers were studied. Each paper was judged by the relevance of title. We paid special attention to conceptual papers concentrating on knowledge management framework, and empirical papers that dealing with life cycle assessment methods for achieving lean supply chain decisions. Key words were ‘knowledge networking and mobilisation’, ‘lean supply chain management’, ‘knowledge-based decision support’, ‘life cycle assessment’, and ‘SECI model’. The final selection contained 21 key references as analysed in this paper.

The conceptual framework is based on the classic SECI model and it concentrates on analysing resource factors including human, knowledge, financial and material so as to achieve the lean concept. To be exact, lean techniques show benefits, such as waste elimination, financial benefits, lead time reduction and low inventory, but there are still some barriers to lean implementation. So such strategy needs to focus on a knowledge network and a good knowledge network can have a significant impact on knowledge transfer and can lead to an effective solution for knowledge mobilisation process. When applying the life cycle assessment into lean supply chain management, it will help set a clear goal to overcome the major drawbacks in lean implementation. There are four steps need to be followed. They are goal definition and scoping, inventory analysis, impact assessment and improvement assessment. In order to reduce cost and waste, how to use life cycle assessment effectively and efficiently is the vital part in lean supply chain management. Further research will conduct empirical research to validate the conceptual framework in industrial environment.

Keywords: knowledge networking, knowledge mobilisation, lean, supply chain management

Problem-Driven Approach to Human Resources Decision Support System Design

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ABSTRACT

The key factor in the success of an organization largely depends on the quality of its human capital and how it is managed. Therefore, organizations are increasingly adopting Human Resources Information Systems (HRIS) to ensure the effective utilization of their human resources (HR). HRIS have vastly improved structured human resource management decision-making while failing to improve semi- or unstructured decision-making. This article thus discusses general issues on Decision Support System (DSS) technologies in order to help Human Resources decision-makers solve unstructured decisions.

This article addresses a problem-driven approach to designing DSS technologies: Our approach will reflect end-user problems in the upstream and in the downstream process it will determine the design choices and potential technical solution. We will thus rely on a categorization of HR's problems for a development mirroring the Analytics. This brings out a new data-driven DSS typology: Descriptive Analytics, Explicative or Diagnostic Analytics, Predictive Analytics, Prescriptive Analytics.

In our research, identifying the problem takes place with design of the solution, so, we would have to resort a significant transformations of representations associated with the HR Analytics application to build an increasingly detailed representation of the goal to be achieved. Here, the collective cognition is reflected in the establishment of transfer functions of representations during the whole of the design process.

Keywords: DSS, HR decision-making, problem-driven approach.

Measuring knowledge sharing performance with DEA efficiency scores: Efficiency model

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ABSTRACT

Performance analysis has become a vital part of the organisational practices in the competitive business world. There are numerous applications used to estimate efficiency in organisations, and most of them assume that inputs and outputs are known with absolute precision. Here, we propose DEA model to assess underlying uncertainty in measuring knowledge sharing performance of an organisation. Further, decision making units (DMUs) with fixed factors are used to measure the impact of the model on the efficiency and to identify the most relevant contextual variables on efficiency. There is overwhelming evidence that performance evaluations are context dependent. A special case of such context effects are the organizational factors, which implies that the inclusion of organisational factors can influence the performance of organisational processes for non-dominated alternatives. Adapting the renowned DEA setting for the area of knowledge management to the performance evaluation context, an analysis was conducted. Culture, leadership, and processes were found to be the significant factors in measuring knowledge efficiency. Managerial implications are addressed.

Keywords: Data Envelopment Analysis, Decision Making Units, Knowledge sharing, Knowledge efficiency.

Decision Support Systems for Sustainable Logistics: A Review and Bibliometric Analysis

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ABSTRACT

Decision-making in logistics is an increasingly complex task for organizations as these involve decisions at strategic, tactical and operational levels coupled with the triple bottom line (TBL) of sustainability. Decision support systems (DSS) played a vital role in arguably solving the challenges associated with decision making in sustainable logistics. This review is a systematic attempt to explore the current state of the research in the domain of DSS for logistics while considering sustainability aspects.

A total of 41 research papers relevant to DSS for sustainable logistics were identified using Scopus database. A bibliometric and text mapping analysis was conducted using various tools including BibExcel, VOSviewer and gpsvisualizer. The findings highlight key themes and their resulting implications and future directions. Some of the main findings include (1) the rising publication trend since 2013 but with low absolute frequency; (2) only one influential journal, International Journal of Production Economics with four publications in the last two years (3) Eastern part of North America, Western Europe and Asia being considered as top contributing affiliations; and (4) limited research in terms of various decision support system configurations, models and addressed issues in sustainable logistics as inferred from text visualization. Furthermore, social impact has been given less attention in comparison to economic and environmental aspects.

This paper paves the way for further research including validation of our findings together with rigorous content analysis for developing a deep insight into this discipline. Moreover, this paper will help interested researchers to make informed decisions in collaborating with other relevant affiliations in this domain.

Keywords: Decision Support Systems (DSS), Sustainability, Logistics, Systematic Review, Bibliometric Analysis, Text Visualization

Incorporating knowledge networks to address risk associated with decision making in IT projects.

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ABSTRACT

Despite extensive research on IT risk factors in order to assist in project risk management, knowledge management is fast becoming a key to governing and controlling risks, uncertainty, complexities and ambiguities. Since managing risk in IT projects is a considerable challenge for numerous organisations, responsive decision-based knowledge that is both timely and adequate is urgently required. Thus, this paper investigates the development of new incorporating knowledge networks framework to address the various issues of risk identification, minimising uncertainty and providing a comprehensive view on practicing knowledge networks for effective risk management in IT projects in various organisations. This study conducts a practice-based approach to examining knowledge networks used in risk management in IT projects. A qualitative case study methodology using an exploratory approach, and comparative analysis, were employed to gain insight into complex phenomena within their contexts. The results shed the light on how knowledge networks help to address risk activities and decision making in IT projects, as well as examining the interrelations between knowledge networks and issues of risk identification. This study helps to bridge the gap in knowledge management theory by proposing a new framework in knowledge networks for managing risk in IT projects; it will also help those working in the industry to increase the efficacy of knowledge networks to improve decision making in IT project risk management.

Keywords: Knowledge Management, Risk Management, Knowledge Networks, IT Project Risk Management.

A multicriteria decision model for selecting wastewater treatment systems for Brazilian industrial laundries

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ABSTRACT

For several years, industrial laundries located in the northeast of Brazil had not implemented any action to minimize the negative impacts of their effluents, thus contributing to environment degradation and several population health problems. Fortunately, the Brazilian government is becoming more intransigent with companies that do not implement a sustainable policy and efficient wastewater treatment plant at the end of their industrial production process. This paper discusses the reality of this region in Brazil and presents a decision-making model based on PROMETHEE II in order to aid a specific industrial laundry in selecting a suitable wastewater treatment plant considering the three spheres of sustainability.

Keywords: sustainability; industrial laundry; wastewater treatment plant; PROMETHEE II.

Challenges in the design of Forest Management Decision Support Systems addressing sustainability and societal demands

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ABSTRACT

The potential for the development of decision support systems (DSS) in forest management is set by decision theory, available technology and methods. Demands for decision support are emerging from challenges and problems of forest management which act as stimuli for the DSS research community. As objectives and approaches in forest management as well as technologies have been changing throughout history, the demand for DSS to support planning and decision making will change in future as well. Given the huge uncertainties regarding to future environmental conditions as well as societal demands DSS are seen promising for implementing strategic ecosystem management. Research tries to cover these demands by improving models, introducing new methods and holistic planning approaches in DSS. Decision analysts and scientists try to cover the complexity of the real world with sophisticated models and methods, which might overwhelm decision makers and DSS users who demand smart and simple applications. The way in which reality is represented in a forest management DSS is depending on the context of the decision support application, the perspective of the actor and the needs of the underlying decision problem. The higher the demand for meaningful cases is, the more emphasis will have to be put on the way how and which information is presented. High importance has to be given on the consideration of the “joy and play” factor in future designs. The Community of Practice (CoP) on Forest Management Decision Support Systems (www.forestdss.org) organizes knowledge about the construction and use of forest DSS. The lessons learned regarding the design and development of DSS allow to draw conclusions on possible future developments. The purpose of the CoP is to provide a platform to share tips and best practices to address the above mentioned dilemmas. In the context of this contribution we present the knowledge repository of the CoP in order to demonstrate its applicability to address the current challenges. We will provide an overview about the Forest Management DSS described and lessons learned documented in the semantic wiki. The information is structured according to several dimensions (type of problem analyzed, models and methods used, knowledge management and participatory planning techniques used) which will form the basis for the presentation. In total 69 DSS are described, 32 case studies are documented and 89 lessons learned are listed. We draw our conclusions on the design dilemmas based on the existing repository.

Keywords: Forest Management, Design, Challenges, Community of Practice, wiki

DSS Optimal for use in Brazil plantation management

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ABSTRACT

Brazil currently has around 7.8 million hectares of planted forests, which supply raw material to several important production chains such as construction, power generation, furniture making, charcoal, pulp and paper production. Planted forests generate about 90 % of roundwood used nationally, supply 85 % of the materials used to produce charcoal and provide around 65 % of firewood used nationally.

Brazilian forest production units are generally extensive areas of more than 500 hectares, commonly divided into even-aged stands. According the forestry law, the size of each forest stand must not be less than 1 hectare.

Considering the size of forest production units and of individual stands, as well as the dispersion of stands within the production unit, there is a clear need for tools that help forest managers to optimize decision-making with regards to planning of the harvest sequence. The optimization of the harvest schedule which takes into account economic (price of wood per m³ and silviculture costs) and spatial drivers (mean distance between each individual stands) may reduce production costs by increasing management efficiency.

This paper presents a new version of the decision support system (DSS) Optimal which was parameterised for plantation management conditions typical of Brazil. A new spatial harvest scheduling model, presented in this contribution, is based on the binary programming method and was developed using real data from a Brazilian forest production unit, localized on the north of Minas Gerais state in Brazil. The goal of the proposed scheduling approach is to maximize the net present value and to secure harvest concentration in each planning period. This case study shows the importance of DSS management conditions and constraints different to those commonly found in Europe or North America.

Keywords: forest plantation, spatial harvest scheduling, spatial constraints, Eucalyptus, mathematical programming

Identifying and Ranking Risk Factors for Supply Chain Resilience Decision Support in FMCG Industry: the Case of Middle East Region

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ABSTRACT

Academics and industry leaders have seen the need to supplement traditional risk management techniques with the concept of resilience that is better designed to cope with extreme complexities, unpredictable events and adaptive threats. However, supply chain resilience is still a more theoretical concept than everyday practice in supply chain management. This paper is concerned with supply chain resilience in the fast moving consumer goods industry. The focus of the work is the development of a structured risk identification and evaluation approach that can offer support to assist supply chain managers in taking proactive decisions to prevent risks prior occurrence. The research takes a practice-based perspective by using a case from real industrial supply chain context in Middle East Region. An exploratory approach has been adopted to identify potential risk factors and causes of risks. Interviews were conducted in order to be able to generate significant themes; types of risks and their sources. Failure Mode and Event Analysis method was used for analyzing potential risks and to assess what might go wrong. The structured risk identification and evaluation approach aims to provide distinctive value for all supply network stakeholders. Furthermore, it helps in guiding decision makers throughout the supply chain decision making process, achieving more informed decisions so that proactive measures can be taken to prevent and handle potential risks. By doing so, ultimately disruptions to supply chains can be minimized and the resilience of supply chains can be improved.

Keywords: Supply Chain Risk Management, Disruptions, Resilience, Structured Approach, Risk Identification and Evaluation.

Knowledge identification, categorisation and prioritisation for ERP implementation success

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ABSTRACT

The global business environment has changed dramatically in recent years, as competition in complex knowledge-based economies has increased. Enterprise Resource Planning (ERP) systems have been viewed as a way to manage increased business complexity, leading to the rapid adoption and implementation of such systems, as ERP can support enterprises to improve their competitiveness. Knowledge management (KM) is crucial for ERP systems implementation, however a highly demanding task. Therefore, the primary concern of this study is to examine the effectiveness of knowledge identification, categorisation and prioritisation that would contribute to achieve ERP implementation success.

Initially, in-depth interviews were conducted with ERP professionals in order to identify and categorise knowledge related to ERP implementations. Subsequently, analytic hierarchy process (AHP) based online questionnaire was developed and used to prioritise knowledge types and sub-types. This study has been able to rank various types of ERP knowledge based on the survey responses from both ERP clients and implementation partners. In total 4 knowledge types and 21 sub-types were ranked based on their contribution to achieve ERP success; four variables of information quality, systems quality, individual impact and organisational impact were used to measure ERP success. Thereby, empirical findings demonstrate exactly what kinds of knowledge which need to be managed providing priority over other knowledge when a client organisation steps into an ERP implementation as well as an implementation partner steps into an ERP implementation. ERP knowledge prioritisation is a new concept for the context of ERP implementation.

Keywords: Enterprise resource planning, ERP implementation, AHP, knowledge prioritisation, knowledge identification, knowledge categorization

Towards real-time ski injury prevention: building a data-enriched DEX-based decision support system for early warning on increased risk of skiing injury occurrence

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ABSTRACT

Although skiing injuries are relatively rare events (only a 2.5 per mille of skier visits gets injured), the consequences with respect to health problems and costs generated are usually very severe. Therefore, finding a way to prevent them or, at least, minimize their influence is, more than ever, an actual topic; especially nowadays when the number of visits to ski resorts constantly rises from year to year.

Contrary to only a few existing papers dealing with the topic, this paper presents promising first results in near-real-time skiing injury detection. The methodology presented in this paper is an extension of a recent research which combines expert and data-based knowledge when building models for a decision support system for early warning of a skiing accident occurrence. We show that proposed data-enriched DEX based approach to decision support modeling leads to comparable, and often, in terms of classification accuracy, much better results, compared to the most commonly used machine learning algorithms (10-fold cross-validation was used). In addition, the benefits of model used are its transparency, consistency and interpretability.

The experimental results presented in this paper are obtained as a result of modeling of a representative skiing season data from largest Serbian ski resort on Mt. Kopaonik and it used three data sources: weather data, ski lifts gates entrance data and injury records from the rescue service. We present average results for 22 location-specific models (each model for one part of the day on the concrete location) plus 2 global models used for benchmark purposes.

Keywords: skiing injury occurrence, DEX, decision support system, early warning, machine learning, Mt. Kopaonik ski-resort

Obstacles to Lean implementation: A systematic review

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ABSTRACT

This is a systematic review of 1088 case studies involving Lean and similar improvement change projects from 2010 to 2015 within multiple employment sectors across the world. These projects involve large-scale organisational and behavioural change, and are aimed at reducing waste and improving competitive advantage. Organisations were separated into two types: those with high project outcomes (successful); and those with mid to null outcomes (unsuccessful). The review aimed to identify the differences between the groups in terms of: the barriers identified to the change; the interventions used to bring about change; and the promoters who supported the change. The review also grouped the barriers and interventions into their socio-technical contexts in order to identify any trends.

The analysis concluded that organisations with successful change-projects were more culturally aware, with a majority of such organisations proposing that cultural unsuitability and organisational philosophy represented barriers to change. Organisations with unsuccessful change projects tended to cite lack of Lean knowledge and poor leadership skill as their largest barriers. Both types of organisation demonstrated an equal amount of investment on resources for Lean process implementation and training, whilst the more successful organisations invested more effort on goal alignment and philosophical adjustment. The cases do not explicitly report on initial assessment activities that test their change readiness in advance of any change project.

Keywords: Lean, Change Management, Goal Alignment, Barriers

ICDSST 2016 Posters



Collab-Net on line: An on line platform for DSS-research collaboration in EWG-DSS

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Recently, the scientific research collaboration has been extended to social network analysis area, which concerns in evaluating the collaborative interaction among papers authors within publication databases. The Collab-Net platform aims to investigate these publication relationship in an automatic way by a Web-based platform. The present system was developed using free platforms for software development and database system purposes. The main goal of the Collab-Net is to allow researchers to analyze their own collaborative network, as well as possibilities for future collaboration among EWG-DSS members only using a Web-based platform, in anywhere at anytime. The Collab-Net system can be used as two end-users profiles: Administrator and Member profiles.

ADMINISTRATOR PROFILE

MEMBER PROFILE

Collab-Net functionalities and technical description:

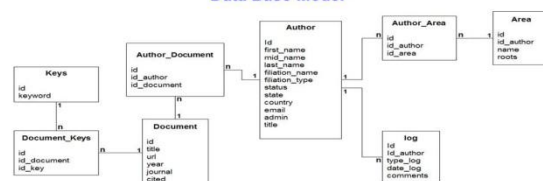
- A login page is available
- Two users' roles are possible
 - Administrator can add new members, edit members profile and remove members, add areas, edit areas, and remove areas.
 - Member can edit his own profile, find researchers by keywords or areas, run members research in the google scholar, and export the results in Excel format.
- Platform available at: <http://www.negplace.com/collabnet/>
- Developed with base on free platforms of software development and database system:
 - Eclipse Integrated Development Environment (IDE) was used to develop the Web application
 - Java development language together with Java Servlet Page (JSP)
 - Database management system MySQL was applied to for storing and retrieving data using Structured Query Language (SQL)

Google Scholar Database → Collab-Net Database
Collab-Net Web Platform Version 2.0

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Join us and support the EWG-DSS, visit the link: <http://www.collab-net.com/>

Data Base Model



CONCLUSIONS & REMARKS:

- The Collab-Net support members in the research of their collaboration network by key areas within the EURO Working Group on Decision Support System;
- This Web-based platform is available for all members registered in the group;
- Enables information access regards the author's published papers, such as: title, journal, year, cite number, and coauthors.
- Information recovered may provide future analysis on the researches collaboration and identify cluster areas of the EURO group.

Currently, the Collab-Net Web-based collect data from the google scholar database.



ABDUTP: A New Approach to Big Data based Urban Territory Planning

Louardi Bradji, Khaoula Tabet, Mohamed Ridda Laouar, Sean B. Eom

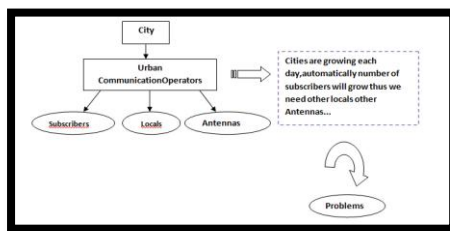
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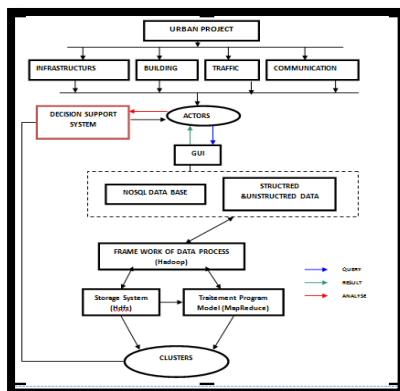
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Recently, Big Data has attracted most of attention for many organizations. It is a new challenging opportunity for data management solutions and services. Due to the large volume of data, velocity, variety and veracity, our approach attempts to extend architectures and requirements of traditional data management. We propose a new approach to identifying the additional needs resulting from these new features of large volumes of data, designing a reference architecture that combines several data management tools such as NoSQL systems, Hadoop, and MapReduce. Moreover, we discuss current technologies that can be used to implement the proposed architecture and offer the ability to handle big data to achieve better results in urban territory planning domain.

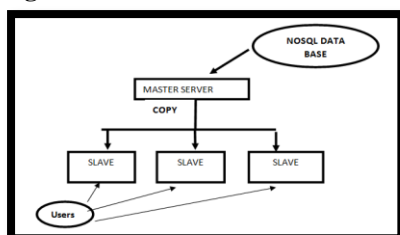
Urban Communication Processes



Global Architecture of Proposed Approach



Big Data Architecture



The global architecture of our approach consists of Actors, representing the decision maker, Graphical User Interface (GUI) that enables the user to communicate with the system, MapReduce that allows the user to entry his query and get results, NoSQL databases encompassing a wide variety of non-relational database technologies. Software like Hadoop can process and store both unstructured and structured data that are extremely large, very complex and changing rapidly. It provides a distributed file system and a framework for the analysis and transformation of very large data sets using the MapReduce. An important characteristic of Hadoop is the partitioning of data and computation across many (thousands) of hosts, and the execution of application computations in parallel close to their data

Conclusions & Remarks:

Urban planning is concerned with organizing metropolitan areas to deal with a wide range of problems caused by cities expanding spontaneously. At its core, city planning aims to provide a safe, organized, and enjoyable home and work life for residents of both new and established towns. The approach presented can help urban planner manage various urban problems from growing data effectively.

End of Abstracts and Posters

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Additional reviewer list

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