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**HELORS**

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**Technological Educational  
Institute of Western Greece**  
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Administration, Patras



**Postgraduate Program in  
Education Management**  
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## **8th International Symposium and 30th National Conference on Operational Research**

**OR in public and private services**

May 16-18, 2019, Patras, Greece

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## **Book of Abstracts**

### **Sponsors**

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# 1. OR in Services

May 16, 2019, 12:30 – 14:00, Room: 1

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## **User Satisfaction and Acceptance of the e-justice system in Greece**

Anastasia Tsotoulidou, Fotis Kitsios, Maria Kamariotou  
*School of Information Sciences, Department of Applied Informatics, University of Macedonia*

### **Abstract**

During the last decades information and communication technologies (ICTs) in e-government have been increased. The implementation of ICTs in the public sector and especially in courts offers new possibilities for citizens, users and more effective services. E-justice systems enhance interaction and communication among different actors and support court administrative staff and judges in streamlining their daily work activities. E-justice systems have encouraged the development of new working practices and organizational procedures improving the court's performance. Despite the fact that this field has attracted the interest of several court management scholars and practitioners, and the money that have been spent to improve court staff's performance and court output, studies that examine the acceptance and user satisfaction of e-justice systems are limited. Thus, the purpose of this paper is to investigate the factors that affect user acceptance and satisfaction of e-justice systems. This paper presents a conceptual framework which is based on the existing literature regarding the success factors and measurements of e-justice acceptance. Also, it analyzes the factors that affect the satisfaction of internal users. The findings of this paper denote the attention paid by court staff to improve the quality and output of e-justice systems. Furthermore, this paper is useful to justice authorities and practitioners in order to design more effective these systems and consider closely these variables in court systems design and usage.

**Keywords:** E-justice system; E-court success; Information Systems; User satisfaction; User acceptance

## **Developing Strategies for a Health Care Organization with Data Mining and Multiple criteria Satisfaction Analysis (MUSA)**

Nikos Tsotsolas<sup>1</sup>, Panagiotis Manolitzas<sup>2</sup>, Nantia Theohari<sup>1</sup>  
<sup>1</sup>*University of West Attica*  
<sup>2</sup>*Ionian University*

### **Abstract**

One of the challenges in the area of healthcare management is the development of methodologies for the evaluation of the offered services of a health care organization. Through the combination of different tools the decision maker will have a set of results that will enhance the decision making process. In addition, via the proposed models the manager has the ability to implement evidenced based strategies based on the data analysis that has been derived from the data of the organization.

The scope of this research is to present a data mining technique that will support the analysis of patients' satisfaction data in cases where low degree of homogeneity of consumers' attitude within the survey sample is assessed. The proposed technique is working with a specific data analysis method called MUSA (Multicriteria Satisfaction Analysis), which is a multicriteria method used in several real world surveys. Our proposed technique leads to the segmentation of an initial sample into more homogeneous subsets. In order to illustrate the practical application of the proposed methodology we evaluate the patients' satisfaction from a Cardiac Surgery Center.

**Keywords:** Multiple criteria analysis, MUSA, WEKA, Health services evaluation

## **Prioritisation of application domains in the public sector: An assessment framework**

Ourania Markaki, Eleni Kanellou, Panagiotis Kokkinakos, Dimitris Askounis  
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National Technical University of Athens, Athens, Greece*

### **Abstract**

The focus in both a European and a global level, is for the public sector to provide not only open, user friendly and inclusive services but also value to all the stakeholders in all the stages of the policy cycle. In this direction, this study aims at providing a framework for assessing policy making processes while bringing forward the policy domains that are still in need of improvement. The framework has its basis on the economic science, specifically on the demand-supply equilibrium, and is a methodology for mapping needs, trends and the available methodologies, applications, databases, tools etc. to application domains, as well as for assessing the former in terms of their criticality or intensity respectively, with the ultimate goal of prioritising application domains and bringing forward those of greater interest, importance, urgency and capability for innovation. The framework is essentially matching demand, which is represented through the needs of the public sector and the trends that affect those needs, to the supply side, which corresponds to all available methods, tools, methodologies, applications and databases that could be utilised by the public sector. The proposed framework is validated through a use case that is presented in the paper at hand.

**Keywords:** Public sector, Assessment framework, use case

The research leading to these results has been supported by the EC Horizon 2020 Programme under the project "Big Policy Canvas" Grant Agreement 769623.

## **Management control in the provision of banking services: Assessing the dynamics between production and service quality**

Ioannis Mitropoulos  
*Department of Business Administration (Patras), TEI of Western Greece*

### **Abstract**

This paper considers that the production and service quality activities of the bank branches should be evaluated simultaneously as complementary components of their overall performance. We propose a two-stage network Data Envelopment Analysis approach to give an insight on the internal structure of the banking sector and study the important role of service quality in the production process. The first stage deals with production performance of the bank branches related to the optimal use of resources to produce banking services, while the second stage deals with the service quality performance using customer reported satisfaction and loyalty measures. A critical aspect in our evaluation process is to examine how well do bank branches perform from the perspective of their customer who use their services. The results indicate the existence of a strong trade-off between production and service quality. Further insights of the study indicate that the branch size significantly affects the service quality and overall performance. Moreover, the employee assessments by the performance appraisal system of the bank are mainly associated with the service production and not with service quality. Finally, this study presents a managerial decision-making matrix and makes recommendations to help bank managers to improve the retail network performance.

**Keywords:** DEA; Market Efficiency; Service quality; Customer satisfaction; Employee appraisal.

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## 2. OR applications

May 16, 2019, 12:30 – 14:00, Room: 2

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### **A value case approach for improving the quality of rail freight services: control tower concept**

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#### **Abstract**

Despite a number of initiatives targeted at modal shift from road to rail the share of rail freight in intra-EU transport has been constantly decreasing over recent decades. Solution for modifying shipper's mode choice could be more efficient targeting the factors affecting the competitiveness of rail freight. Among these factors the most important are: reliability, visibility, lead time, cost and flexibility. Improvement of these factors could be achieved by a higher level of coordination between all railway and non-railway related stakeholders in transport chain. Rail enabled control tower concept may substantially improve communication and information sharing between these stakeholders. It represents an innovation that requires the support of multiple stakeholders in order to be implemented successfully. In this paper, Value Case Methodology is used for assessment the feasibility of control tower implementation in order to make a collectively accepted solution and value alignment of all involved actors. Stakeholder's preferences are quantified by applying the Analytic Hierarchy Process. It is concluded that the stakeholders as well as the experts consider the whole concept as a necessity and therefore, it was not so hard to make the agreement about this collective action.

**Keywords:** control tower, freight transport, railway, value case methodology, Analytic Hierarchy Process.

### **Analyzing Consumers' Behavior and Purchase Intention: The case of Social Media Advertising**

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School of Information Sciences, Department of Applied Informatics, University of Macedonia

#### **Abstract**

During the last decades users of social media are dramatically increased creating profiles in different social media in order to spend their free time on, sharing their opinion, warnings, experiences or information, in a virtual place. Another important activity for users of social media is the purchase of products using online channels. As a result, social media has become a most valuable part of everyday activities for people. So, companies use them in order to interact with their consumers, create a networking marketing opportunity and sell their products. As a result, the social and commercial experience of consumers is widely enriched online, while online channels offer to companies the opportunity to promote and sell their products in a direct way to consumers. In recent years, many academic papers have been published focusing on different topics regarding to social networking platforms. However, there is a lack of studies that examine consumers' purchase intention, their behavior and their need to discuss their experience about a product or a service that they have used. Thus, the purpose of this paper is to examine the effect of social media advertising on consumers' behavior, on their purchase intention and their wish to spread their personal experience by using a product. Data were collected using online questionnaires to 221 consumers who use social media. Data were analyzed using Regression Analysis. The results of this study show that both social media and branding influence customers' habits and their purchase intention. Also, social media and branding motivate consumers to use techniques such as the Word of Mouth in order to discuss about the characteristics of products that they have bought.

**Keywords:** Social media, Consumers' behavior, Consumers' perception, Purchase intention, Branding

# A Robust Model for Pollution Routing Problem Considering Noise and Greenhouse Gas Emission

Hani Shahmoradi-Moghadam<sup>1</sup>, Omid Samani<sup>1</sup>, Jörn Schönberger<sup>2</sup>  
*Technical University of Dresden, Germany*

## Abstract

One of the most important goals of green logistics is to reduce the destructive side effects of freight transportation which can lead to several types of health risks. The pollution routing problem (PRP) is an extension of the vehicle routing problem (VRP) which considers greenhouse gas emission in addition to the travel time, cost, and delivery constraints. Another environmental impact of vehicles, especially in urban areas is noise emission which is ignored in optimization PRP researches. This form of pollution endangers physical well-being by causing annoyance, hearing loss, heart disease, mental issues for children, and sleep disorders. In this paper, using noise emission mathematical equations, we aim to reduce noise and exhaust gas emission in VRP with respect to delivery and time window constraints. Our model presents a scenario-based robust optimization model for PRP, considering noise and greenhouse emissions as well as inherent demand uncertainty. In order to model the uncertainty of the problem, we adopted a scenario-based robust optimization approach which considers uncertain scenarios with a determined occurrence probability. Furthermore, based on the noise effecting factors such as speed and acceleration of the vehicle, we include day-night sound level ( $L_{dn}$ ) penalty. This model suggests a range of solutions that can be selected according to decision maker conservatism level and preferences. To examine the performance of the model, a real-world data sets from PRPLIB instances which are randomly selected from the cities in United Kingdom. The results approve the possibility of finding a sustainable solution for VRP which takes into account various parameters including cost, social, and also environmental aspects of freight transportation for a vehicle fleet.

**Keywords:** Pollution Routing Problem (PRP), Noise emission, Harmonoise model, Sustainability, Robust optimization, VRP

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# 3. Decision Making

May 16, 2019, 15:00 – 16:30, Room: 1

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## Digital Transformation and User Acceptance of Information Technology in the Banking Industry

Ioannis Giatsidis, Fotis Kitsios, Maria Kamariotou  
*University of Macedonia*

### Abstract

During the last decades information and communication technologies (ICTs) in the banking sector have been increased. The banking industry has spent a lot of money in order to use new technologies for the improvement of financial services. Traditional business model of banks in the financial service industry have changed by the increasing digitization. New players, either financial or non-financial companies have already entered into incumbent's markets in order offer more effective services with increased quality. Furthermore, customer relationships with banks and employees workload have changed with the use of digital technology and impact on customer service performance. Despite the fact that this field has attracted the interest of several scholars and practitioners, and the money that have been spent to improve the quality of services in the banking sector through the use of ICTs are increased, the studies that examine the digitalization of financial services are limited. Thus, the purpose of this paper is to synthesize and analyze the findings of the existing literature review in order to answer the following question; how do digital technologies shape the landscape of the financial service industry?. A conceptual framework is developed in order to present the diverse aspects of IT enabled transformation in the financial service industry as well as their relationships.

**Keywords:** Digital transformation; Information Technology; Internet banking; Adoption; User acceptance

## Implications on marketing mix decisions when Agro-tourism enterprises decide to act internationally with the use of Internet: Ranking of importance of the main factors towards standardization and adaptation

Theodore Tarnanidis<sup>1</sup>, Jason Papathanasiou<sup>1</sup>, Vasilis Kostoglou<sup>2</sup>

<sup>1</sup>*University of Macedonia, Thessaloniki*

<sup>2</sup>*Alexander Technological Institute of Thessaloniki*

### Abstract

The scope of this article is to assess and leverage the standardization and/or adaptation process of marketing mix elements for enterprises who act in different markets in the agro-tourism industry. In general it is argued that the use of internet through technological advancements can be characterized with success as the powerful force that drives and leads the world toward a converging commonality. Similarly, the common trade liberalization with bilateral and free trade areas and agreements among different countries, have converged to the existence to a more homogenous consumers and markets that build the first steps for the globalisation and the evolution of global standardized marketing strategies, over the last decades. The main findings of the literature suggest that the similarities between countries are substantial more than the exist differences. On the other hand, the perceived differences among countries cannot be eliminated and treated as a single one and therefore successful companies in order to achieve profit maximization they need to tailor their marketing strategy to local marketing environment. In doing so, we have collected data from Greek Agri-tourism entrepreneurs, where they ranked and assessed the relative importance of the main factors towards of a more Stand/Adapt marketing strategy, with relevance to the marketing mix elements by formulating a more favorable strategy according to the perceived preferences of information. Finally, a thorough discussion and conclusions are given to different research practitioners and policy makers.

**Keywords:** *International marketing mix, internet marketing, intelligent systems in marketing, multicriteria analysis, PROMETHEE, Greece.*

# The Big Policy Canvas project: Transforming the public sector into an efficient and evidence-based policy making structure

Eleni Kanellou, Ourania Markaki Panagiotis Kokkinakos, Ariadni Michalitsi-Psarrou, Dimitris Askounis

*Decision Support Systems Laboratory, School of Electrical & Computer Engineering,  
National Technical University of Athens, Athens, Greece*

## Abstract

The rapid transformation of both technology and society pose the need for the public sector to change how it operates. In order for change to be facilitated, the establishment of new types of evidence-informed policy design and implementation is needed. So far, the public sector was focused on making services and data available online, specifically in an EU level. Currently, a new need has emerged, and that is for the public sector to be based on an open and collaborative model, based on effectiveness. In this transformation, certain tools are required in order to facilitate the change and cover the needs of the public sector in an effective manner, by using the most recent technological advancements, while taking into consideration the existing trends. This study presents the methods, methodologies, standards, applications, frameworks and databases, available in both the public and private sector, that can be used in the transformation of the public sector. The aforementioned tools are analysed across five different fields, namely their technology readiness level, implementation or customisation cost, ease of use, open license availability and big data potential. Specifically, for the big data potential, the tools are evaluated using the Big Data Value Association (BDVA) reference model. Finally, these tools are mapped against the policy domains and across the policy cycle stages, so that the policy domains and policy cycle stages, coupled with tools, can be brought forward.

**Keywords:** public sector, methodological assets, technological assets, big data

The research leading to these results has been supported by the EC Horizon 2020 Programme under the project “Big Policy Canvas” Grant Agreement 769623.

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# 4. Routing and Scheduling

May 16, 2019, 15:00 – 16:30, Room: 2

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## An Advanced Routing and Scheduling System for Dangerous Goods Transportation

Evrpidis Kechagias, Sotiris P. Gayialis, Grigorios D. Konstantakopoulos, Georgios A. Papadopoulos  
*National Technical University of Athens*

### Abstract

The transportation of dangerous goods is usually a process involving risks for both the staff implicated in this process and potentially the entire population in the event of an accident. In order to limit these embarrassing situations, a set of rules need to be established, which should be considered as binding and inevitable. Critical factors affecting the efficiency of the transportation of such goods include on-time delivery (especially for goods with short usable time), compliance with safety rules, right packaging, observance of the measures to protect those who come into contact with these materials and avoidance of possible risks. In recent years, vehicle routing systems have rapidly developed, but are mainly used to facilitate vehicle routing from the perspective of reaching destinations on time or with the minimum cost, without considering the safety of the transport. Of course, when a vehicle transports dangerous goods, safety must be a priority, as such an accident will cause incalculable disasters. At the same time, many of these dangerous goods have a limited lifetime and therefore need to be delivered just in time. Otherwise, the impact (economic, environmental, social) will be significant. The scope of this paper is to describe the conceptual design and the methodological approach for the development of such a routing and scheduling system. This system will be specialized in the transportation of dangerous goods, taking into consideration the aforementioned factors affecting the efficiency of such deliveries and therefore provide safe and accurate routes for the vehicles.

**Keywords:** Routing and Scheduling System, VRP, Dangerous Goods, Transportation, Hazardous Materials, Radioactive materials.

### Acknowledgement

The present work is co-funded by the European Union and Greek national funds through the Operational Program "Competitiveness, Entrepreneurship and Innovation" (EPAnEK), under the call "RESEARCH-CREATE-INNOVATE" (project code: T1EΔK-00527 and Acronym: SMARTRANS).

## A sustainable inventory policy for two substitutable products

Iris-Pandora Krommyda<sup>1</sup>, Vasileios A. Tatsis<sup>2</sup>, Konstantina Skouri<sup>1</sup>

<sup>1</sup>*Department of Mathematics, University of Ioannina*

<sup>2</sup>*Department of Computer Science & Engineering, University of Ioannina*

### Abstract

We study an inventory problem considering two products with a fixed shelf life. The products are ordered simultaneously from the same supplier. We assume that their demand is freshness dependent, so in order to increase sales the retailer offers a single markdown near their expiration date. We also assume that the products are substitutable, so in case of a stock-out for one of the products, a known fraction of its demand can be satisfied by using the stock of the other product. In this context, our model can be applied to the management of foodstuffs. Hence, in accordance with EU guidelines for food waste reduction, we assume that unsold items at the end of the replenishment cycle can be donated to non-profit organizations or be sold at a salvage price to a secondary market. The optimal replenishment policy is determined in order to maximize the retailer's profit. Numerical examples are conducted in order to examine the influence of different system parameters on the optimal policy.

**Keywords:** Inventory management; Substitution; Perishability; Food waste



## Optimizing collateral allocation: A comparative study

Konstantinos Papalamprou<sup>1</sup>, Efthymios P. Pournaras<sup>2</sup>

<sup>1</sup>*Aristotle University of Thessaloniki, Department of Electrical and Computer Engineering*

<sup>2</sup>*National and Kapodistrian University of Athens, Department of Economics*

### Abstract

The collateral allocation strategy followed by a financial institution is considered as one of the crucial factors determining its available liquidity to conduct business. Moreover, given the scarcity of the external liquidity sources observed in the last decade for particular banking systems (Greek included), the optimization of the procedure allocating the available collaterals to the associated loans/credits seems to be one of the top priorities for the financial institutions. Different approaches have been developed in order to handle the aforementioned allocation problem that can be found in the relevant literature. Recently, Papalamprou et.al. have modelled this problem by the means of a bipartite graph and a mathematic programming formulation has been provided viewing the whole setting as a variant of the well-known transportation problem. In this work, empirical results produced by the proposed model are compared with those produced by other models/methodologies developed for the same problem. In particular, parameters of the associated formulations are being stressed in order to examine the behavior of these different models under different scenarios. Finally, we comment on the results and the underlying assumptions of each modelling methodology as well as on the possible extensions of the proposed methodology.

**Keywords:** Collateral allocation, transportation problem, credit risk.

## Optimal order quantity for an inventory system with defective items

Georgios Karakatsoulis, Konstantina Skouri

*Department of Mathematics, University of Ioannina*

### Abstract

A continuous review inventory system with deterministic demand and defective items (low quality items) is considered. The fraction of defective items is a random variable. The order quantity is subjected to a 100% screening process with a fixed screening rate. The defective items are sold as a single batch at the end of the process in a lower price. Due to defective items, stockouts can occur and they are complete backlogged. Perfect and low quality items have different holding costs per unit per unit time. The replenishment policy that minimize the total cost of the system is derived. The proposed model integrates and extends previous existing models.

**Keywords:** Defective items; random yield; optimal order quantity; inventory

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# HELORS PhD and MSc Awards

May 16, 2019, 17:00 – 18:00

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## **Proactive Computing in Industrial Maintenance Decision Making**

Alexandros Bousdekis

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*Supervisor: Professor Gregoris Mentzas*

Proactive event-driven computing refers to the use of event-driven information systems having the ability to eliminate or mitigate the impact of future undesired events, or to exploit future opportunities, on the basis of real-time sensor data. Industrial maintenance decision making can benefit from these advancements in order to tackle with the increasing challenges in today's dynamic and complex manufacturing environment in the context of Industry 4.0.

To this end, the current thesis combines and brings together the research fields of Industry 4.0, Predictive Maintenance and Proactive Computing in order to frame maintenance decision making information systems in the context of Industry 4.0. To do this, it utilizes methods and techniques for operational research, data analytics and machine learning. To this end, it proposes:

Proactive decision methods, capable of handling uncertainty, applicable to maintenance operations and its interrelationships with other manufacturing operations. The proposed methods are based upon Markov Decision Process (MDP), Dynamic Programming and optimization methods (e.g. joint optimization, portfolio optimization, etc.).

Algorithms for continuous improvement of proactive decision making through the proposed Sensor-Enabled Feedback (SEF) approach. The proposed algorithm is based upon noise filtering and regression methods on sensor data.

Algorithms for context-awareness in proactive decision making. The proposed method utilizes Bayesian Networks and clustering techniques.

The aforementioned algorithms have been embedded in a proactive event-driven information system which was deployed and evaluated in real industrial environments, in two business cases: (a) the Norwegian offshore oil drilling company MHWirth; and, (b) the German automotive lighting equipment company HELLA Group. Further evaluation was conducted with extensive simulation experiments. Finally, the lessons learned and the managerial implications of the proposed approaches were discussed.

## **Strategic Information Systems Planning using Multicriteria Analysis: Evaluation of SMEs Performance in Greece**

Kamariotou Maria, Fotis Kitsios

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### **Abstract**

Strategic Information Systems Planning (SISP) supports business goals and business strategy, through the use of Information Systems (IS). Findings from previous surveys indicate that many managers make too much effort to SISP process while others too little. When managers invest too much effort, the process could be confusing, delayed or its implementation could be prevented. When managers avoid investing too much time to the process, the implemented plans could be inefficient so the objectives could not be achieved. Consequently, the assessment of the process is significant because managers can reduce these unsatisfactory results. Findings conclude that managers concentrate more on Strategy Conception and Strategy Implementation and they do not invest time on Strategic Awareness and Situation Analysis. As a result the implemented plans are not effective, successful and they do not meet the objectives. Researchers have noticed that family businesses focus on business's long-term sustainability, but they do not develop strategic planning. As 80% of businesses have been highly influenced by the financial crisis and the majority of them are Small-Medium Enterprises (SMEs) firms in Europe, more attention is needed to be paid to and how they use IS and strategic planning in order to deal with the crisis. The purpose of this thesis is explore SISP facilitators for firm performance and a

competitive advantage in order to provide conclusions regarding on the implementation of this process in SMEs. Data is collected using questionnaires to IS executives in Greek SMEs. MULTICRITERIA Satisfaction Analysis (MUSA) is used to measure IS executives' satisfaction. The contribution of this thesis is twofold. Firstly, it expands the current knowledge regarding the significance of SISP and secondly it helps IS executives to improve the process.

**Keywords:** Strategic Information Systems Planning; Success; SMEs; Firm performance; Competitive advantage

## **Robust Optimization Approaches for Portfolio Selection: An empirical comparative analysis**

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### **Abstract**

The field of portfolio selection is an active research topic, which combines elements and methodologies from various fields, such as optimization, decision analysis, risk management, data science, forecasting, etc. The modeling and treatment of deep uncertainties for the future asset returns is a major issue for the success of analytical portfolio selection models. Recently, robust optimization (RO) models have attracted a lot of interest in this area. RO provides a computationally tractable framework for portfolio optimization based on relatively general assumptions on the probability distributions of the uncertain risk parameters. Thus, RO extends the framework of traditional linear and non-linear models (e.g., the well-known meanvariance model), incorporating uncertainty through a formal and analytical approach into the modeling process. Robust counterparts of existing models can be considered as worst-case reformulations as far as deviations of the uncertain parameters from their nominal values are concerned. Although several RO models have been proposed in the literature focusing on various risk measures and different types of uncertainty sets about asset returns, analytical empirical assessments of their performance have not been performed in a comprehensive manner. The objective of this study is to fill in this gap in the literature. More specifically, we consider different types of RO models based on popular risk measures and conduct an extensive comparative analysis of their performance using data from the US market during the period 2005-2016. For the analysis, three different robust versions of the mean-variance model are considered, together with two other robust models for conditional value-at-risk and the omega ratio. The robust versions are compared against standard (non-robust) models through various portfolio performance metrics, focusing on out-of-sample results. The analysis is based on a rolling-window approach.

**Keywords:** Robust optimization, Portfolio selection, Financial engineering, Decision making under uncertainty

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# 5. Innovation management

May 17, 2019, 10:00 – 11:30, Room: 1

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## **Open innovation in SMEs: Intention and Influence to contemporary entrepreneurship**

Emmanouil Kasaris, Fotis Kitsios

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### **Abstract**

For over 15 years, Open Innovation (OI) has been a trending strategic approach to the process of innovation of enterprises. The number of studies that have been carried out indicate that this approach has positive effects on the Innovation Performance of Small and medium-sized enterprises (SMEs). These studies highlight both the importance of the adoption of the OI, and its synergy with Entrepreneurship Orientation (EO) for SMEs. The purpose of this study is to cover the research gap by studying the factors that impede and motivate SMEs to adopt OI as well as to examine the effect of OI and EO on Innovation Performance of Greek SMEs. After a thorough literature review using Webster's and Watson's (2002) methodology, 68 articles were collected in order to create a conceptual framework. This framework shows the relation between OI, EO and the impact of these variables synergy on Innovation Performance of SMEs. The survey is conducted in Greek SMEs and aims at promoting policies and guidelines to enhance the level of Innovation and competitiveness. The main finding of the study is that the extent of the positive effect of OI depends on the roles of Entrepreneurship Orientation in the improvement of the Innovation Performance. It is found that the mentality of the leadership of a company affects OI and EO, and therefore the new way of profit generation. It is also noted that "too much" or "too fast" OI may have negative results on Innovation Performance of SMEs. The results of this study have theoretical and practical implications for managers in the improvement of the innovation process in SMEs. Thus, the positive effects of the synergy of EO and OI, which are examined in this study, indicate the importance of Entrepreneurship to the successful adoption of Open Innovation.

**Keywords:** Open Innovation, Barriers, Motives, Entrepreneurship Orientation, Innovation Performance

## **Measuring consumers' e-shopping and delivery service experience within a behavioral context**

Alexia Irakleous<sup>1</sup>, Panagiotis Karsiotis<sup>2</sup>, Serafim Kapros<sup>1</sup>

<sup>1</sup>*University of the Aegean, Department of Shipping and Trade*

<sup>2</sup>*Hellenic Post S.A*

### **Abstract**

The rising effect of e-commerce has changed the way goods are delivered as a result to influence customers' purchase decisions and parcel providers' delivery services. In fact, the variety of delivery options and the perceived quality of the delivery service are major criteria for online customers and hence directly impact e-retailers' success in the marketplace. From an operational point of view, delivery services are complex and subject to many constraints. It seems that, two different worlds are in parallel, one is driven by marketing (e-commerce) while the other (logistics) is driven by a series of operational demands. Both have different business timeframes, different backgrounds, different usage of IT systems and solutions and different performance indicators for their businesses. Both e-commerce and delivery markets need to fully aligned to respond to the requirements and consumers' demands. This paper focuses on the delivery services provided in last-mile of the supply chain, i.e., delivering products to the end-consumer, and highlights the need for developing competitive parcel delivery services for the transport and logistics service sector. The purpose is to understand consumer behavior on to delivery service attributes, and last mile logistics services in order to provide managerial guidance and to develop insights on logistics services for future research.

More precisely, it is estimated consumers' most recent e-purchase and delivery service experience, based on data collected from a survey of Greek consumers in 2018. Measuring consumer's most recent

e-shopping and delivery service experience by incorporating behavioral data is of primary interest both to e-retailers and to transport and logistics operations.

This study can help both scholars and practitioners understand the importance of delivery service attributes and customer service in an online shopping environment and across customers in Greece.

**Keywords:** e-shopping, delivery service experience, e-shopper, e-shopping motive, overall satisfaction

## **Developing a risk-based policy portfolio analysis framework for scaling-up participatory innovation in Greece**

Apostolos Arsenopoulos<sup>a</sup>, Nikolaos Mastromichalakis<sup>a</sup>, Vangelis Marinakis<sup>b</sup>, Haris Doukas<sup>a</sup>, John Psarras<sup>a</sup>

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### **Abstract**

Policy portfolio configuration feature high complexity due to the numerous possible combinations of actions. The latter, imply a great deal of difficulties when it comes to defining and implementing them, mainly because of the underlying uncertainty as to their impact on the beneficiaries.

The aim of this paper is to develop a methodological framework that enables the integration of participatory innovation into decision-making processes at local level. The proposed actions are assessed both by the citizens and experts against major socio-economic risks (e.g. bureaucracy, social acceptance, etc.), through customised questionnaires. These actions constitute the alternatives of a Multicriteria Analysis problem, where the citizens' individual assessments are eventually grouped into a collective one, resulting to a final score (risk) for each action. The methodology also includes a bi-objective linear programming model, for eliciting the optimal policy portfolios, which comprise of sustainable actions, as well as the optimal budget allocation to each of them. To summarise, the proposed methodology responds to the following problem: developing an optimal portfolio of policy measures that meets the energy saving or CO<sub>2</sub> reduction target, for a given budget, in the context of minimizing the total cost and risk involved. An online platform, integrating the said methodology, will also be developed to facilitate the whole initiative.

The proposed methodology will provide significant added-value to the decision-making processes at local level and to the well-being of the society in general, allowing both stakeholders and decision-makers to design and jointly select the most effective courses of actions towards reaching sustainability, in the context of facilitating the Sustainable Energy and Climate Action Plans (SECAP) implementation. This research has been co-financed by the European Union and Greek national funds through the Operational Program Competitiveness, Entrepreneurship and Innovation, under the call RESEARCH – CREATE – INNOVATE (project code: T1EDK-05167).

**Keywords:** *Participatory innovation; sustainability; portfolio analysis; optimisation; platform; decision-making.*

## **MCDA for assessing the impact of digital transformation on hotels performance in Thessaloniki**

Dimitrios Mitroulis, Fotis Kitsios

School of Information Sciences, Department of Applied Informatics, University of Macedonia

### **Abstract**

In a digital economy, customer experience is heavily influencing customers' hotel decision processes. This is the main reason explaining why hotels are looking at how new digital technologies could enable their transformation, stay ahead in competition and improve their organisational performance. Even though existing literature discusses the benefits of digital transformation, measurement of its impact on organisational performance is still vague. Therefore, the aim of this research is to explore the impact of digital transformation on hotels' performance. Data were collected addressing questionnaires to senior hotel and IT executives in Thessaloniki, Greece. The collected data were analyzed using the MUSA (MULTicriteria Satisfaction Analysis) method. The results of this research provide further information

related to the impact of digital transformation on hotels' performance. Moreover, it seems that senior hotel and IT executives are somehow satisfied with the organisational performance after enabling digital transformation.

**Keywords:** digital transformation, strategy, organisational performance, digital innovation, MCDA

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# 6. Efficiency measurement

May 17, 2019, 10:00 – 11:30, Room: 2

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## Commercial & Military Turbofan Aero-Engine Efficiency Assessment: An Application of VSBM Two-Stage Network DEA

Angelos T. Kottas<sup>1</sup>, Michail Bozoudis<sup>2</sup>, Michael A. Madas<sup>3</sup>

<sup>1</sup>*Aristotle University of Thessaloniki, School of Economic Sciences, M.Sc. Programme in Logistics and Supply Chain Management*

<sup>2</sup>*NATO Communications and Information Agency*

<sup>3</sup>*University of Macedonia, Department of Applied Informatics, Information Systems and e-Business Laboratory (ISeB)*

### Abstract

Data Envelopment Analysis (DEA) constitutes a widespread efficiency benchmarking methodology with a multitude of applications in production process efficiency of enterprises belonging to the same industrial sector. Despite the fact that research relevant to DEA has mainly focused on the efficiency of production systems, limited attention has been given to the efficiency evaluation of engineering systems with similar structural and functional features (e.g., automobiles, power plants). Moreover, the pretty scarce previous literature dealing with the efficiency evaluation of engineering systems has implemented basic DEA models of low discriminatory power, mainly due to the existence of a quite high portion of efficient Decision Making Units (DMUs). In the current research effort, a methodological framework incorporating non-oriented Variable Returns to Scale (VRS) Variable intermediate measures Slacks-Based Measure (VSBM) Two-Stage Network DEA is implemented, aiming to assess the efficiency of turbofan aero-engines, currently utilized by active-duty commercial and military aircraft. On top of investigating the positive correlation of DEA efficiency with engineering efficiency, we also pursue the evaluation of DEA efficiency of near-future turbofan designs. A major conclusion of the current paper is the alignment of the selected DEA model efficiency with propulsive efficiency. More specifically, the aero-engine features that are positively associated with increased DEA efficiency are also associated with increased propulsive efficiency. The developed methodological framework could potentially evolve into a tool for efficiency assessment of any turbofan aero-engine being in the conceptual or preliminary design stage, thus offering an alternative pathway for defining the features which render a turbofan aero-engine competitive or even superior to the existing offered range.

**Keywords:** turbofan aero-engines, efficiency evaluation, benchmarking, data envelopment analysis

## Energy Efficiency performance of European Industries under a Metafrontier Framework

Eirini Stergiou, Kostas Kounetas

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### Abstract

Industries are directly relying on energy for the production of their output in the production process. As economic growth becomes more intensive in the last decades, the demand for energy has been increased massively. However, along with economic growth industries tend to pollute the environment in many ways. For this reason, EU has devoted sizable resources towards energy efficient and saving policies through the adoption of social and physical infrastructures to support CO<sub>2</sub> mitigation and encourage sustainable development. We model the energy efficiency performance of European industries taking into account both desirable and undesirable outputs under a metafrontier framework for 27 European countries and 14 industrial sectors of manufacturing over the 1995-2011 period. In a first stage, DEA and DDF approaches were used for the estimation of energy efficiency performance and technology gaps. In a second stage, estimators are employed in order to investigate the

determinants that could influence energy efficiency such as the role of energy mix, the existence of path dependence of technology heterogeneity in conjunction with the role of the corresponding group membership.

**Keywords:** European industries, Energy Efficiency, DEA, DDF, Metafrontier, Convergence

## **Measuring the efficiency of Greek regional airports prior to privatization using Data Envelopment Analysis**

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<sup>1</sup>*Democritus University of Thrace, Department of Civil Engineering, MSc Programme in System Engineering & Management*

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<sup>3</sup>*University of Macedonia, Department of Applied Informatics, Information Systems and e-Business Laboratory (ISeB)*

### **Abstract**

Air transport plays a fundamental role for local and global economic development. Greek airports in particular constitute an important infrastructure asset for regional development and the promotion of the domestic touristic product. However, many regional airports suffer from economic difficulties due to the lack of high volume of traffic, while others provide poor quality services during the commercially critical summer months. In this paper, we employ Data Envelopment Analysis (DEA) based on a data set obtained by the Hellenic Civil Aviation Authority, in order to benchmark the technical efficiency of the 14 Greek regional airports during 2016, just before their privatization. An output-oriented DEA model is used to assess separately the efficiency of the main infrastructural elements of the airports (i.e., terminal, airside area) on an annual and seasonal basis. The input of the terminal model includes the terminal area, as well as the number of baggage collection belts, gates, and check-in points, while the output deals with the total number of passengers. As far as the airside model is concerned, this uses as input the number and length of runways, the apron size and aircraft parking capacity, with the output being the total number of aircraft movements. The key factors influencing efficiency are investigated in order to suggest necessary improvements or upgrades and compare them with existing investment plans in the currently privatized airports. The results show that a significant lack of efficiency at regional airports can be mainly attributed to the relatively low ability to manage their resources, so as to increase output transport volumes. Finally, most airports are characterized by high scale efficiency and increasing returns to scale (IRS). The latter may provide incentives for investments towards airport capacity on expansion or upgrade projects and a more efficient management of scarce airport resources.

**Keywords:** airport efficiency, privatization, performance benchmarking, data envelopment analysis

## **Balancing efficiency and quality with a Stochastic-DEA model**

Panagiotis Mitropoulos

*Department of Business Administration (Patras), TEI of Western Greece*

### **Abstract**

When the Data Envelopment Analysis (DEA) is applied in healthcare efficiency assessment it is often conducted on values that include proportions, like satisfaction, mortality, or adverse event rates which are estimated from partial samples. These proportional estimates can produce significant statistical bias that may lead to the highly variability of the efficiency scores, even for fairly large sample sizes. In this paper, we develop a stochastic DEA-based methodology to measure performance when the endogenous (e.g. efficiency) and exogenous variables (e.g. perspectives of patients' satisfaction), which are incorporated in the assessment, are inversely related. This methodology identifies benchmark units that are not only highly performing but are also assigned scores for their exogenous variables, which are at least equal to user-defined critical values. We apply the model to compare the efficiency and quality differences between Greek and Cypriot health centers.

**Keywords:** Data Envelopment Analysis; Chance constraints; Satisfaction; Primary health care



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# 7. Multicriteria Decision Making

May 17, 2019, 12:00 – 13:30, Room: 1

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## **Evaluation of alternative sustainable urban mobility scenarios using the PROMETHEE Multi-criteria Decision Making methodology**

Maria Morfoulaki<sup>1</sup>, Jason Papathanasiou<sup>2</sup>  
*Centre for Research and Technology Hellas Hellenic Institute of Transport  
University of Macedonia Dept. of Business Administration*

### **Abstract**

The publication of the White and Green European Transport Paper in 2011, highlighted the need of the urban mobility planning to shift, towards sustainable means of transport (public transport, bicycle and pedestrian trips), changing the current travelers' behavior which still remains in favor of the private car, so that the key criterion of the modal choice to become the environmental protection. The new urban sustainable planning framework, aims to give space to the human (citizen) rather than to the car.

This shift towards Sustainable Urban Mobility has resulted in the creation of an 8-step methodology by DG Move and ELTIS, the so called "SuMP Cycle" for developing Sustainable Urban Mobility Plans. The "SuMP Cycle" after the analyses of the current situation, determines the future vision of each city, the alternative mobility scenarios that serve this vision and in the end, specifies the transport infrastructures, measures and policies that each city should develop in order to become more eco-friendly and green.

One of the most critical step in this procedure is the determination of the weight of each city's targets for the future and the assessment -with specific criteria -of all the alternative scenarios (measures, policies, infrastructures), which will be optimally combined, in order to cover succeed these targets. The aim of the proposed article is to present the implementation of the Promethee multicriteria decision making methodology in order to examine the impact of each alternative scenario on the weighted criteria (targets) and present the final assessment results and the measures that were finally selected for implementation in a specific case, through this procedure. Conclusions for the barriers and strengths of the current methodology in the SuMP Cycle procedure will be also analysed.

**Keywords:** Multicriteria analysis, decision making, sustainable mobility plans, weighted planning priorities.

## **Procurement of a Public Address System (PAS) in an urban rail transport company with the support of a PROMETHEE II multicriteria decision-making process**

Nikolaos Panayiotou, Vasileios Stavrou, Vasileios Aggelopoulos  
*National Technical University of Athens*

### **Abstract**

The procurement of specialized systems which are meant to serve many stakeholders at the same time is a complex and multifactorial process. Usually, during the procurement process a large number of potential suppliers are assessed, something that calls for the design of a sound decision making process. In many cases, products or services which are finally chosen do not fully satisfy the stakeholder needs due to the nature of the process or the failed criteria selection. The aim of the article is to present an alternative method for evaluating and selecting the optimal Public Address System (PAS) in order to be implemented in an urban rail transport company.

Based on the methodology followed, five possible alternatives (PAS) were initially rated in a series of 40 go / not go criteria. The four alternatives that met the necessary conditions passed to the second evaluation round. At this point of the process, the PROMETHEE II method and the corresponding VISUAL PROMETHEE software were used in order to rank the alternatives using a set of 42 criteria, each one with its own weight, classified in three groups (Functional, Technological and Financial Requirements).

In order for the final (ranking) result to be more reliable and stable, two different scenarios were analyzed, in each of which different criteria weights were used. The results of the two scenarios were combined into a final evaluation result. The PROMETHEE method which was applied in the presented case study reduced the degree of uncertainty during the selection process of the PAS. The methodology followed helped to structure the problem in a completely transparent way, which is a crucial fact, in order to be built trust in the decision making process as, based on the way the PROMETHEE method algorithm calculates the ranking of the alternatives, the final result is rendered acceptable to all stakeholders without any misunderstandings or objections.

**Keywords:** Multi-criteria decision-making, PROMETHEE, Public Address System, Urban rail transport

## **Robustness Improvement in UTA methods by exploitation of strength of preferences information**

Athanasios Spyridakos, Nikolaos Tsotsolas, Isaak Vryzidis  
*School of Business, Economical and Social Sciences, University of West Attica*  
*Business Administration Department, School of Engineering, University of West Attica*

### **Abstract**

UTA methods concludes to the assessment of additive value preference models based on Decision Makers (DMs) global preferences expressed by the rank ordering of a limited set of alternative actions evaluated into a consistent family of criteria. An adaptation of UTA methods is presented in this research work, which utilizes additional preference information concerning the strength of preferences at limited pair of alternative actions of the reference set. The DM is prompted to express his/her Strength of Preferences providing a range of values that an alternative  $a_i$  is preferred than another  $a_j$  utilizing visual techniques. The Linear Program of UTA methods is enriched with new conditions, the solution of which concludes to a more robust preference model. The above mentioned approach is illustrated through a set of case studies. The proposed adaptation of UTA methods can be used a priori during the initial elicitation of DM's global preferences or a posteriori in the frame of post optimality and robustness analysis, constituting a new feedback of UTA methods.

**Keywords:** Multicriteria Decision Aid, Disaggregation - Aggregation Approach, Robustness Analysis

## **Development of Decision Support System in Energy**

Efstathios Gerampinis, Fotini Kalafati, George Arampatzis, Nikolaos Matsatsinis  
*Decision Support Systems Laboratory, Technical University of Crete*

### **Abstract**

The aim of this work is the development of a decision support systems in energy who can calculate the thermal response of the buildings with methods of heat transfer in buildings elements.

The system support decision making of the customer through the application of the multicriteria method UTASTAR, who will be suggesting the appropriate equipment that can be used to enhance the energy efficiency of the buildings, according to the preferences of the residents.

The proposed methodology will be applied to data from market research.

**Keywords:** decision support system, multi-criteria analysis, heat transfer, energy, thermal response of buildings

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# 8. Service management

May 17, 2019, 12:00 – 13:30, Room: 2

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## Information Systems Planning and Business Strategy: Implications for Planning Effectiveness

Maria Kamariotou, Fotis Kitsios

*School of Information Sciences, Department of Applied Informatics, University of Macedonia*

### Abstract

Within the current dynamic, turbulent and digitalized environments, Strategic Information Systems Planning (SISP) is a significant activity for efficient management and strategic use of Information Systems (IS). However, the implementation of SISP process in today's complex environments is difficult because organizations need to consider and take multiple planning perspectives, including managerial, environmental and organizational factors simultaneously, not to deal with only one important perspective. Although, previous researchers have examined the impact of SISP on success, providing recommendations for the implementation of the process based on data collecting from large organizations, they haven't paying attention on Small Medium Enterprises (SMEs). SMEs incline to pay attention on the business's long-term sustainability than perceiving short-term profitability. The current economic crisis has negatively influenced a huge number of activities and the majority of SMEs found themselves in a new complex financial environment where uncertainty prevails and the market characteristics are radically inverted. Except for difficulties in their financial aspect, their relative lack of technological, managerial and human capabilities make them unable to face the crisis and be competitive. Thus, the purpose of this paper is to explore SISP facilitators for success and a competitive advantage. Data were collected using questionnaires to IS executives in Greek SMEs. Data were analyzed using Regression Analysis. The results of this study show that IS executives are not aware of analyzing the external IT environment and evaluating opportunities for IS development. Furthermore, they do not formulate IT strategies and priorities, so they cannot anticipate risks and crises. They only concentrate on Strategy Implementation and as a result the IS projects are ineffective and unsuccessful.

**Keywords:** Strategic Information Systems Planning, IS strategy; Competitive advantage, Success; Small Medium Enterprises

## Digital Intelligence: The Impact of Digital Technologies on Human Thinking

Emmanouil Stiakakis, Yiorgos Liapis

*University of Macedonia*

### Abstract

It is a fact that digital technologies strongly influence every aspect of our lives, even the way we react to the stimuli of our environment, understand messages, solve problems, communicate, and generally all the ways we think. This paper presents evidence from the literature that several cognitive abilities are very different in the digital and the tangible (physical) environment. For example, people's reading behaviour is quite different in the digital environment, since less time is devoted on in-depth reading and sustained attention on an electronic document has decreased, mainly due to hyperlinks which distract people from continuous and concentrated reading. For the purpose of this study, an online survey was conducted among under- and post- graduate students of two universities and a technological educational institute of the city of Thessaloniki, Greece, with a sample size of 2,345 individuals. The findings of the survey show statistically significant differences about how specific cognitive activities are performed in the digital and the tangible environment. More specifically, six activities, i.e. reading, playing a game, information seeking, communication, learning to do things, and multitasking were investigated in the two environments. The survey respondents with an advanced usage of digital devices perceive that their own abilities for those activities are better in the digital environment. On the other hand, those who were classified as novice users cannot perceive different abilities between the two environments. The findings of this study reveal signs of digital intelligence, a new way of thinking that is emerging as people are trying to adapt to the radically changing and highly

demanding digital environment. The existence of digital intelligence and the results of its future investigation will have serious implications on what children should learn and how they could learn better in the digital age.

**Keywords:** digital skills, digital competences, digital intelligence, lifelong learning, digital technologies, digital environment

## **Supply Chain Performance Measurement: The case of Fresh Fruits and Vegetables sector**

Sidiropoulos George, Tsotsolas Nikos

*University of West Attica, School of Administrative, Economic & Social Sciences, Department of Business Administration*

### **Abstract**

The purpose of this paper is to present the current state of the research in performance measurement in relation to managing the supply chain of Fresh Fruits and Vegetables (FFV) sector and to discuss the need and importance for a new supply chain evaluation model. The major problem is the difficulty in finding a suitable set of KPIs for measuring the supply chain performance of this specific sector. This research proposes the Supply Chain Operations Reference (SCOR) Model as an appropriate approach to deal with the performance measurement of Fresh Fruits and Vegetables (FFV) sector. There is a considerable amount of literature which is concentrated on the description of value or supply chain of the examined sector for each country separately but there is a lack of total evaluation models of these chains. Thus, there exists a necessity of estimating and evaluating the overall performance of such a supply chain. This review fills partially this gap in the extant Supply Chain Performance Measurement (SCPM) literature. Future work will concentrate on examining specific information from companies that operate in this same sector. Towards the development of a weight function model and in order to estimate the weights of SCOR's Level 1 KPIs that have been selected as the proposed evaluation criteria in our case, Weights Assessment through Prioritizations (WAP) method was applied. Results indicated that the suggested approach will help decision makers and various stakeholders involved in the supply chain management of Fresh Fruits and Vegetables (FFV) sector to understand the importance of an integrated supply chain for better evaluation and management.

**Keywords:** Fresh Fruits and Vegetables (FFV), Supply Chain Operations Reference Model (SCOR Model), Supply Chain Performance Measurement (SCPM), Weights Assessment through Prioritizations (WAP), Key Performance Indicators (KPIs).

## **Innovation Management and New Service Development Strategy: A Case Study in Cultural Heritage Institutions**

Eleni Champipi<sup>1</sup>, Fotis Kitsios<sup>2</sup>, Maria Kamariotou<sup>2</sup>

*<sup>1</sup>Cultural Organizations Management, Hellenic Open University*

*<sup>2</sup>School of Information Sciences, Department of Applied Informatics, University of Macedonia*

### **Abstract**

During the last decades the industry of art has changed significantly. Museums are significant pillars of economic growth and competitiveness. They try to meet visitors' expectations operating in a highly competitive leisure market. As cultural industries have been facing many transformations in the last decade due to the development of emerging technologies and the increase of visitors' expectations to receive additional services to improve their experience, museum managers try to find out processes that increase value proposition. To be able to develop innovative services that comprehend the underlying business logic of service provision, managers should shift to a new strategic planning, a new organizational structure, and market launch process. Despite the increased recognition of researchers to New Service Development process, academics have given less attention to development activities for the innovation of new process and services in cultural institutions. The emerging field of transformation in cultural industries provides a new perspective to approach service innovation and has encouraged many museums to invest in the improvement of the visitor's experience. Thus, the purpose of this paper is to investigate the factors that affect the process of service development in cultural industries. This paper presents a conceptual framework which is based on the existing literature regarding the New Service Development and success factors of innovative services. The findings of this

paper denote the attention paid by museum managers to improve the process of New Service Development and increase visitors' experience. Furthermore, this paper is useful to practitioners in order to design more successful services and consider closely these factors in service systems design.

**Keywords:** New Service Development; Innovation; Service Strategy; Success factors; Cultural heritage

## **International tourists' perceptions about road safety in Attica region**

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Research & Teaching Associate Department of Industrial Management & Operational Research,  
National Technical University of Athens  
University of Macedonia, Department of Applied Informatics Information Systems and e-Business  
Laboratory (ISeB)*

### **Abstract**

Road accidents constitute the second cause of death and injuries for international tourists, while road traffic risks are higher than many other widely communicated travel health risks. International travelers face higher risks on the roads in destination countries than the risks faced by the residents. The perceived exposure to accident risk affects the travelers' opinion about the value of their travel and consequently influences the image of a country as a safe tourism destination. Greece is one of the most attractive tourist destinations in the world, with the tourist industry constantly growing. However, it is among the worst performing countries in Europe in terms of road safety with a comparatively high annual rate of road accident fatalities. Therefore, we aimed to conduct a survey on international tourists' perceptions about road safety and mobility in the Attica region. The survey was implemented in popular touristic places such as Athens International Airport and Acropolis Museum in December 2018, with the use of a structured survey instrument/questionnaire. In total, we collected and analyzed 514 completed questionnaires addressing tourists' perceptions about: (i) personal responsibility and responsible driving culture, (ii) road infrastructure condition and limitations, (iii) rented vehicles condition and equipment, (iv) behavior of other drivers and (v) overall influence on general travel experience. A rather alarming finding of the analysis was that 41% of the respondents felt less restricted to fully comply with the traffic code, while 20% of young people reported non-compliance with the "Do not drink and drive" rule. Furthermore, the large majority of respondents (71%) found themselves dissatisfied with road safety conditions, which may negatively affect the country's image as a safe touristic destination.

**Keywords:** tourists' road safety, risk perceptions, travel experience

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# 9. Optimization

May 17, 2019, 14:30 – 16:00, Room: 1

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## Optimization of the hydrothermal generation scheduling problem using an enhanced multi-objective evolutionary algorithm

Tsalavoutis Vasilios, Vrionis Constantinos, Tolis Athanasios  
*School of Mechanical Engineering, National Technical University of Athens*

### Abstract

The Hydrothermal Generation Scheduling Problem (HGSP) is an operational research problem commonly encountered in energy management. It concerns the determination of the optimum generation schedule of the thermal and hydro plants within a power system in order to efficiently serve the electricity demand. HSGT is a mixed integer, non-linear and highly constrained optimization problem; commonly the operating states of the thermal generators are represented by binary variables, while continuous variables are employed to denote the power output of the thermal plants and the water discharge of the hydro plants. In this paper, a Multi-Objective Evolutionary Algorithm (MOEA) is proposed for the optimization of the HGSP, in which the minimization of total operation cost and the emissions of the power system are considered as objectives. The proposed MOEA is based on the Differential Evolution algorithm combined with a fast non-dominated sorting and ranking procedure. A series of heuristic repair strategies are engaged to repair infeasible solution vectors and steer the search towards adequate generating schedules. Moreover, the Window Mutation, which is a problem-specific mutation operator, is employed to enhance the overall performance of the MOEA. The proposed solution methodology is tested on a power system comprising ten thermal units and a cascade of four hydro power plants in order to verify its effectiveness. The results of the proposed approach are compared to those of other well established MOEAs. The comparison reveals that the proposed approach has managed to derive Pareto fronts, which are significantly better compared to those of the benchmark MOEAs.

**Keywords:** Hydrothermal Generation Scheduling, Multi-objective Optimization, Differential Evolution, Evolutionary Algorithms

## Cooperative Covering Location Problems under Uncertainty

Maria Michopoulou<sup>1</sup>, Ioannis Giannikos<sup>1</sup>

<sup>1</sup>*Department of Business Administration (Patras) TEI Western Greece*

<sup>2</sup>*Department of Business Administration, University of Patras*

### Abstract

This paper deals with discrete spatial problems, in which a set of demand points are served by a set of facilities. The facilities can operate on a predetermined set of candidate positions. The service offered to a demand point may be the result of the interaction between located facilities. This interaction may involve cooperation among the facilities, as presented by Berman et al. (2011) or Averbakh et al. (2014). The objective is to determine the facilities to be located such that the demand points are appropriately covered, taking into account the cooperation (or interference) between the selected facilities.

In this paper we consider situations where coverage may be affected by the weather conditions, technical malfunctions or other factors beyond the control of the system planners, as described in Karatas (2017). We assume that each potential facility may offer coverage according to a given probability distribution. The objective is to determine the system configuration that achieves the most robust coverage. We present several versions of the basic coverage model and discuss the use of exact and heuristic approaches for determining the optimal solution.

**Keywords:** cooperative coverage, Mixed Integer Programming, heuristics

### References

[1] I. Averbakh, O. Berman, D. Krass, J. Kalcsics and S. Nickel "Cooperative covering problems on networks", *Networks* 63(4), 334–349, 2014

[2] O. Berman, Z. Drezner and D. Krass “Discrete cooperative covering problems”, Journal of the Operational Research Society 62, 2002–2012, 2011

[3] M. Karatas, “A multi-objective facility location problem in the presence of variable gradual coverage performance and cooperative cover”, European Journal of Operational Research 262, 1040–1051, 2017

## **Constrained Nonlinear Optimisation Using Resilient Backpropagation as Search Method**

*Apostolos Kotsialos*

*Generation Business Unit Public Power Company Greece*

### **Abstract**

This paper builds on the earlier work of [1] and [2], where the Resilient BackPROPagation (RPROP) algorithm is recast as a search direction and step selection method for solving smooth and non-smooth, unconstrained and simply-bounded nonlinear optimisation problems. Although RPROP was originally proposed as a learning algorithm for neural networks training, it has been shown that it is competitive and sometimes can outperform highly sophisticated algorithms, especially for solving non-smooth problems. The simplicity of implementation, the relatively low computation effort, as only one function and one gradient evaluation are required per iteration, and the good convergence properties make RPROP a highly efficient algorithm for large scale problems. RPROP can tolerate errors in the gradient evaluation, since it is based on the partial derivatives’ sign rather than their values, allowing its application to non-smooth Lipschitz continuous objective functions. The constrained optimisation problems considered here are transformed to unconstrained problems by use of exact  $\ell_1$  as well as quadratic penalty functions and combinations thereof. RPROP is applied to the unconstrained problems within a simple multi-start framework for improving convergence. Penalty-barrier as well as augmented Lagrangian methods may be considered in this setting as well. A set of benchmark academic problems available from the literature are used for demonstrating and evaluating the overall algorithm’s performance. Detailed computational results and the impact of the main RPROP parameters, the directional step increase rate and the restart frequency, are reported. Hence, this paper extends the investigations reported in [1] and [2] to nonlinear constrained problems.

**Keywords:** constrained nonlinear optimisation, resilient backpropagation, penalty methods.

### **References**

[1] A. Kotsialos, “Non-Smooth optimization based on resilient backpropagation search for unconstrained and simply bounded problems,” Optimization Methods and Software, Vol. 28, Nr. 6, pp. 1282–1301, 2013.

[2] A. Kotsialos, “Nonlinear optimisation using directional step lengths based on RPROP,” Optimization Letters, Vol 8, Nr. 4, pp. 1401–1415, 2014.

## **Half-integral optimal solutions in real-life applications**

Konstantinos Papalamprou, Leonidas S. Pitsoulis, Eleni-Maria E. Vretta  
School of Electrical and Computer Engineering, Aristotle University of Thessaloniki

### **Abstract**

Certain classes of matrices have been proven to be of significant importance in combinatorial optimization. One such well-studied class is that of totally unimodular matrices, i.e. matrices whose each square submatrix has determinant in  $\{0,1,-1\}$ . It is well-known that total unimodularity is strongly associated with a class of optimization problems which can be solved in polynomial time. In particular, integer programming problems with totally unimodular constraint matrices and integral right-hand side vectors can be solved efficiently by relaxing the integrality constraints and then applying well-known algorithms devised for linear programming problems (e.g. Simplex). Another special class of matrices is that of  $k$ -regular matrices ( $k \in \mathbb{N}^*$ ) which furnish a natural generalization of totally unimodular matrices. Generally speaking, as total unimodularity guarantees integrality of the optimal solution,  $k$ -regularity guarantees  $1/k$ -integrality. In this work, we focus on the case of  $k=2$  and present formulations of real-life problems with constraint matrices being 2-regular. Moreover, it is known that 2-regularity yields integral optimal solutions for optimization problems with right-hand sides having as elements multiples of 2. Based on that, we shall present formulations of instances of real-life optimization problems

yielding integer solutions when the parameters of these problems satisfy certain conditions. Finally, we comment on the generalization of the aforementioned observations and findings when the constraint matrix of such problems is  $k$ -regular with  $k > 2$ .

**Keywords:** half-integrality, total unimodularity,  $k$ -regular matrices



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# 10. Workshop in Education I

May 17, 2019, 14:30 – 16:00, Room: 2

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## **Legislative Reforms in Experimental Schools and their Reversals**

Anastasios Drongitis

*TEI of Western Greece, MSc program in Education Management*

### **Abstract**

A debate has been going on in recent years about the role of Experimental Schools. Several scientific and political arguments have been raised, concerning the goals of Experimental Schools. However, it is frequently expressed that these goals are not met. With a "model of analysis" the scientific position that educational reforms are not independent from the socio-economic, cultural and political factors of the historical moment that are happening and with tools the Historical Comparative Analysis and the Interpretation Circle, attempts to approach the legislative reforms concerning the Experimental Schools and of their reversals.

The aim of this study is to describe and compare the two main reforms concerning the Experimental Schools in Greece: one in 1929 (Venizelou Government) and one in 2011 (Papandreou Government) regarding the context in which their gradual reversals took place, with the individual legislative changes that took place as the social, economic and political environment changed. It is noted that following the implementation of a comprehensive legislative reform of the Experimental School legislation and changes in the overall environment, changes are gradually taking place in individual but important points that eventually lead to the total dysfunctionality of the overall original philosophy of legislation. The comparative review of the Experimental Schools legislation, in conjunction with the factors that formed it, leads to a deeper understanding of how the Experimental Schools operate and is a useful tool for making alternative proposals and criticizing the proposed legislative changes.

**Keywords:** Experimental Schools, Educational Legislation, Educational Reform, Excellence, Innovation

## **The contribution of educational staff training to crisis management among teachers. A case study of the prefecture of Ilia**

Nikos Kousavelos

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### **Abstract**

Training is of particular importance to the teacher as well as to the efficient functioning of schools, while at the same time it implies improvement, modernization of the educational work and crisis management within the school. The modern challenges in the role of a school director are related to the broadening of the obligations of the school and its orientation to the needs of modern society. In addition, both the requirements and the modern challenges of education highlight the need to train directors so that they can respond to the complex and modern school environment and develop initiatives to better exercise their role. Crisis Management requires the director to adopt different roles to ensure a safe and calm environment for both students and employees. Crisis management in the school unit should find the director ready to intervene with the necessary knowledge and skills to deal with the specific incidents and contribute to the restoration of the smooth functioning of the school. The purpose of this study is to investigate the views of the directors and deputy directors of the schools of the prefecture of Ilia in regard to their training and contribution to crisis management among teachers. The sample of the survey consisted of 61 directors and deputy directors (out of a total of 79) of elementary schools in the prefecture of Ilia. Quantitative methodology was used to analyze the data and carry out the study. The data were analyzed by the Frequency method and the internal cohesion index (Cronbach) was checked. According to the findings, most of the sample has experienced a crisis among teachers and considers that the most common type of crises is interpersonal. Directors and deputy directors believe that the main causes of crises are individual factors, the way of management and weaknesses in the organization. Finally, the overwhelming majority of the sample thinks that the director needs to have expertise on crisis management issues between colleagues and therefore the training of educational staff on these issues becomes necessary and obligatory.

## **Assessing the educational task as a job satisfaction factor amongst secondary teachers**

Kalavrouzioti Maria  
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### **Abstract**

Teacher evaluation provides the capacity for professional development; enhances accountability; contributes to improving the quality, efficiency and effectiveness of the educational system in general. Whilst its acceptance is critical, it does not appear to have occurred in Greece with the introduction of teacher evaluation legislation that was finally abolished due to intense teacher reactions.

Our investigation of the evaluation's effectiveness as a job satisfaction factor initially reviewed the Greek and international literature and then conducted a quantitative investigation with a closed-ended questionnaire amongst 30 secondary teachers at two Patras schools on: 1) the educational evaluation's contribution to professional development and enhanced accountability; 2) whether teachers should be evaluated; 3) evaluation contributing to job satisfaction; and 4) evaluation system features and types significantly contributing to job satisfaction.

Results indicate that evaluation significantly contributes to job satisfaction; evaluations do not have the same positive effect on job satisfaction; the most effective professional development systems contribute to job satisfaction as opposed to those designed for enhancing accountability. Our findings coincide with previous investigations where the potential for professional development is a significant factor for forecasting job satisfaction amongst Greek teachers. Factors that may reduce job satisfaction levels are evaluation systems designed to enhance accountability, which are likely to make teachers feel less independent or that more control is exercised by educational authorities.

Given recent national developments, our results are useful in formulating Greek educational policy and designing evaluation systems acceptable to teachers.

The results are significant but cannot be generalised due to the restrictive small population sample exclusively drawn from Patras schools. Future investigations need to investigate larger populations that will export more credible results that can be better used by policymakers.

**Keywords:** Educational evaluation, professional development, accountability, job satisfaction, education

## **Adult Education Policies: Basic Dimensions According to the International Discourse**

Karanikola Zoe, Panagiotopoulos Georgios, Mitropoulos Ioannis  
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### **Abstract**

The development of policies aimed at educating and developing citizens is of crucial importance as a result of the particular contemporary societal characteristics, the global demographic changes, the intense rhythm of immigration, the rapid development of technology and the increase in the unemployment rate. This research, through the analysis of the text "Third World Report on Adult Learning and Adult Education (UNESCO, Grala III, 2016), comes to explore the key dimensions of adult education policies. The methodology used to investigate the material is the qualitative analysis and in particular the methodological tool of thematic analysis with the contribution of thematic networks. The analysis of the text shows that policies supporting adult education should be universal, holistic, inclusive and without exclusions. In addition, they are based on the "Belem Framework, 2009" and the "UNESCO Recommendation on Adult Education and Learning" (2015). A second dimension concerns the need for the Member States to modernize their policies, to control and evaluate their implementation. The proportion of public funding in the field of adult education constitutes a challenge, since it remains fairly low in the government's investment priorities, which seem to give priority to other areas, such as health, infrastructure and social welfare. Moreover, it appears that all countries do not interpret international policies in the same way. Thus, policies are sometimes used as a general frame of reference and sometimes as well-established practices. These practices could be implemented by governmental organizations, research institutes, civil society organizations, trade unions and other agents. Finally, governments, in cooperation with regional and local authorities and services are called

to broaden their policies and strengthen adult learning and education. Towards this direction, the development of the mobility and participation of trainees in programs such as ARION, Comenius, Grundtvig, Erasmus and Erasmus plus is absolutely of major importance (UNESCO, 2016).

**Keywords:** Policies, international discourse, thematic analysis, adult education

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# 11. Multiple criteria analysis

May 17, 2019, 14:30 – 16:00, Room:1

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## A Single User Model for Circular Economy Driven by the Internet of Things

Nikolaos Christodoulakis<sup>1</sup>, Nikolaos Petroulakis<sup>1</sup>, Nikos Tsotsolas<sup>2</sup>

<sup>1</sup>*Institute of Computer Science, Foundation of Research and Technology - Hellas*

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### Abstract

This paper presents an approach on how Internet of Things (IoT) can support Circular Economy (CE) with the use of sensors in an interconnected environment. A background investigation of related works is provided, focusing on synergies and challenges of IoT and how CE can assist on overcoming these challenges. Based on that, the main part of this work is focused on the description of a new method for Circular Economy with IoT support for a small environment – for a Home CE – IoT place. This method is called Ariadne and applies techniques from Operations Research in order to assist the decision maker (for example the house keeper) about the use of the products where are considered as assets.

**Keywords:** Circular Economy, Internet of Things, Interconnected Devices, Multicriteria Decision Aid, Decision Support

## An ordinal regression approach for analyzing consumer preferences in the art market

Evangelos Grigoroudis<sup>1</sup>, Constantin Zopounidis<sup>1</sup>, Laurent Noel<sup>2</sup>, Emiliós Galariotis<sup>2</sup>

<sup>1</sup>*Technical University of Crete*

<sup>2</sup>*Audencia Business School*

### Abstract

The art market is an important sector of the global economy, as shown by the significant real value added by the arts and cultural production in the GDP of several countries. The significant price fluctuations that may observed in the market of artistic goods can be explained not only by the economic conditions and other economic environmental factors, but also by the changing preferences of buyers. The main aim of this study is to develop a prediction model for estimating the price of artistic goods. The prediction model is based on multiple criteria decision analysis, and specifically in ordinal regression modeling. The proposed approach uses linear programming techniques (goal programming) in order to minimize the deviations between predicted and actual values. Such a modeling provides a flexible non-parametric approach that may overcome potential problems of standard linear regression models. The presented study uses a large set of auction data from the Art Deco furniture market and considers several different criteria that may influence buyers' preferences. These criteria are related to the physical or intangible characteristics of artistic goods. The results are mainly focused on analyzing buyer's preferences (e.g., contribution of several factors to the price of artistic goods, comparisons between different product categories). Finally, the proposed approach includes a stability analysis phase in order to evaluate the robustness of the results.

**Keywords:** Ordinal regression; Multicriteria decision analysis; Consumer preferences; Art market; Auctions; Prediction modeling.

## Investigation and Classification of Risk Factors in Supply Chains: A Multi-Criteria Approach

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*University of Macedonia, Department of Applied Informatics, Information Systems and e-Business Laboratory (ISeB)*  
*University of Macedonia, Department of Business Administration*

### Abstract

The objective of the current paper is the investigation and classification of the risk factors that govern the Distribution Network (DN) Selection. We follow a Multicriteria Decision Analysis approach by applying the Fuzzy TOPSIS methodology.

Literature review revealed the risk factors, which create variability in the Supply Chains. Risk factors composed the criteria selection in the multiple criteria model. Furthermore, six alternatives of DN are taken under consideration. A questionnaire survey was conducted in order to capture the field experts' opinions on the evaluation of specific DN according to the predefined criteria. Later on, an analysis of the research is presented. Results show the optimal structure of the DN and they were validated by comparing them with the theory from Chopra & Meindl (2006) and Elmokrini et al. (2015). Finally, we are discussing the results and make suggestion for further research.

**Keywords:** Distribution Network, Supply Chain Risk Management, Multi Criteria Decision Making, Fuzzy-TOPSIS

## A Multicriteria Evaluation of Passenger Satisfaction in Greek Railways

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*University of Macedonia, Department of Applied Informatics*  
*University of Macedonia, Department of Applied Informatics, Information Systems and e-Business Laboratory (ISeB)*

### Abstract

It is widely accepted that passenger satisfaction is the key to success in transportation systems as a primary driver of passenger choices with respect to transportation modes or services. Service quality and passenger satisfaction may positively affect not only the repetitive or increasing use of the transportation service, but can be also critical for the expansion of the existing clientele. Previous transportation-related research has identified many significant factors for passenger satisfaction, however, the effect of these factors on overall passenger satisfaction has not been sufficiently studied. The current research work aims to develop and implement a multicriteria framework for assessing passenger satisfaction in Greek railways. We conducted a Systematic Literature Review (SLR) in order to identify methodologies and dimensions, criteria or indicators of passenger satisfaction and transport service quality assessment, with particular emphasis placed on rail transport. The MUSA (Multicriteria Satisfaction Analysis) method has been selected to address the given assessment problem with view to multiple criteria of passenger satisfaction. In our paper, 8 first-level service quality dimensions and 32 second-level indicators were identified. The primary dimensions pertain to Safety, Cleanliness, Comfort, Ticket Purchase, Information, Reliability, Personnel and Accessibility. For the purposes of our survey, a structured survey instrument has been developed, with the data collection process being currently in progress. The findings of this paper may be helpful for practitioners who can include important quality attributes to satisfaction measures on the basis of passengers' perceptions, as well as design and implement strategies for passenger satisfaction improvement.

**Keywords:** service quality, passenger satisfaction, railway, multicriteria evaluation, MUSA methodology

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# 12. Workshop in Education II

May 17, 2019, 14:30 – 16:00, Room:2

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## **Skills and Emotional Intelligence: Study and Investigation of Studies Guides of Greek Pedagogical Departments of Primary Education**

Katerina Alexopoulou, *Karanikola Zoe*

*TEI of Western Greece, MSc program in Education Management*

### **Abstract**

Emotional Intelligence is directly linked to the professional development of teachers and the existence of positive results in the field of education. The aim of this present study is to investigate the Emotional Intelligence-related skills in the Study Guides of Greek Primary Education Teachers as these skills play a key role in the professional development of the educators. The subject was investigated using the qualitative methodology. This type of research design and analysis provides an in-depth exploration. Specifically, it deals with the study and exploration of the "Study Guides of the Greek Pedagogical Department of Primary Education" during the academic year 2017-2018, with the methodological tool of quantitative content analysis. Emotional intelligence related skills are present in national contexts according to the results of the research. In a national context these skills are present in the Study Guides of the Greek Primary Education Departments. In general, Emotional Intelligence skills are national contexts. For an in-depth understanding of this issue it would be helpful to investigate other Study Programs from other Universities.

**Keywords:** Emotional Intelligence, Professional Development, Teachers, Study Programs

## **Quality of Education and Economic Development in the EU**

Karampelas Panagiotis

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### **Abstract**

In this paper a methodological approach is made to the relationship between education and development of a country. A person's earnings depend on the total education he has received all years of formal and non-formal education and working experience according to the Mincer (1974) equation, but also by other factors. The relationship between education and development grew when economists began to give importance to the human capital factor as a factor in the developmental functions. From the development of human capital theory to integration into the development and transformation functions, overall education, skills throughout the educational and work path gained play a key role in shaping a country's growth rate. Please note that there are functions that incorporate other quantitative training features, other qualities, and others. The research question is whether quality education and the factors influencing it positively affect a country's GDP. But the study expands its research into the European Union. In the paper, answers are given on the relation of qualitative characteristics in the countries of the European Union with the least squares method in the form of panel data. The paper deals with an econometric model of Barro J. (1999) which has been transformed for EU data. The data is from databases such as World Bank and Oecd in the period 1990-2013. The results of the study follow the basic economic development principles and the variables that are statistically significant confirm the initial assumptions that education and economic development go hand in hand.

**Keyword:** Education, Growth, Human Capital.

## Programming in education. Developing collaborative teaching practices

Maria Pavlochristou

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### Abstract

The key importance of programming has emerged in a large number of cases of the application of new methods and innovative actions in education. It is a precondition for the development of the school unit and an important mechanism for its empowerment. However, there is a limitation in its application due to the nature of the Greek education system. The aim of this paper is to demonstrate the value of programming in education and to present a proposal for its implementation in the development of cooperative teaching practices in public primary schools. From the present research it becomes clear that programming is apt to apply in the field of cooperation development among primary school teachers in the country. In particular, it is possible to solve a number of problems related to the use of teaching material already developed or to be developed by the teachers and to the dissemination of the good teaching practices applied by them.

**Keywords:** programming, education, public schools, collaborative teaching

## Desires and perceptions of primary school teachers about Leadership

Panagitis Mitropoulos, Vasiliki Kourkouta, Konstantinos Christopoulos

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### Abstract

Leadership is a very important factor in the proper functioning of a school organization, has been studied by many researchers and is considered to be one of the key elements of an effective school. Educational leaders are faced with new and multiple challenges as the larger social, political and economic environments become more complex. Transformational leadership is increasingly seen as the most appropriate and desirable form of leadership for the success of an educational organization. However, the heavily centralized and bureaucratic Greek education system does not allow the leader to develop transformative practices to a great extent. The purpose of this paper was to investigate the degree of three leadership styles (transformational, transactional and avoidant) in primary school managers in the prefecture of Achaia, according to teachers' perceptions, as well as to explore their desired leadership style. The survey was conducted in April and May of 2018 in 123 primary teachers. The questionnaire used is weighted and consists of two parts: A) The demographic characteristics and B) The Multifactor Leadership Questionnaire (MLQ) with 34 questions about what the teachers perceive and the same 34 questions about what teachers want. The SPSS23 tool was used for statistical analysis of the data. The most prevalent and desirable leadership style in public primary schools in the prefecture of Achaia is the transformational (M. 3,6 and 4,09 respectively), followed by the transaction (M 3,46 and 3,76 respectively) followed by the one to be avoided 2.17 and 1.86 respectively). Of all the leadership dimensions, the dimension of the "Transformational Leadership - Characteristics" - Dimension of the Transformational Leadership- collected the highest median in the perceptions and the wishes of the teachers (3.84 and 4.4 respectively). If the Greek education system becomes less centralized it will allow more transformative practices, which is in line with the wishes of teachers.

**Keywords:** Leadership, Primary Education, Leadership Style, Transformation, Transaction, Passive-Avoidant Leadership