
# Book of Abstracts

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# Simulation models for improving order picking via different class-based storage policies and material handling equipment: The case of a multinational food and beverage company


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## Abstract

It is widely common that order picking is one of the key processes in a storage facility. The latter incorporates the finding and extracting of products from a storage location in order to fulfill customer orders. In practice, picking process can be complex since a series of parameters must be taken into consideration such as material handling equipment, routing policies (e.g. S-shape/traversal, return, combined, optimal), picking policies (e.g. discrete, batch, zone picking) and so forth. Therefore, order picking is considered to be the most labor-intensive and expensive activity for a warehouse. Thus, the need for overall picking improvement drives companies to identify innovative methods and techniques to improve picking efficiency and accuracy and the same time minimize operational cost. In this paper, we investigate the use of electric pallet trucks and various storage class-based scenarios in order minimize order picking time for order fulfilment in a multinational food and beverage company. Initially, we represent the current operation of order picking by using an appropriate simulation model. The latter includes the use of back-to-back racks and S-shape/traversal routing policy for discrete picking. Subsequently, we present five what-if scenarios using simulation modelling: (a) comparison of manual vs. electric pallet truck using S-shape routing policy for discrete picking, (b) use of a combination of electric pallet truck and four different class-based product storage polices vs. no storage policy (S-shape/traversal routing policy for discrete picking is applied in all four scenarios as well). The results obtained are encouraging showing a reduction of total order picking time that varies between 9% and 12%.

keywords: Back-to-back racks; electric pallet truck; class-based product storage; simulation models

# Testing alternative product storage policies and warehouse equipment for order picking improvement via simulation modeling: The case of a medical supplies and health products company


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## Abstract

Warehouses handle a significant amount of processes ranging from receiving, put-away, storage to replenishment, picking, packing and dispatching of products. Across the various functions in a warehouse, order picking, referred to as the operation of retrieving the required SKUs from a storage location to fulfill a customer order, represents over 50% of the overall operating cost in a storage facility. Order picking is based on a series of parameters such as routing policy (e.g. S-shape), picking policy (e.g. discrete picking), storage policy (e.g. ABC class-based), picking density as well as average order size to name a few. Inappropriate order picking may result in less worker productivity, more works stress and higher labor turnover. In this paper we investigate the use of alternative product storage policies (e.g. class-based) and warehouse equipment (e.g. electric pallet truck) in a real-life case of a medical supplies and health products company. Initially, we represent the current operation of order picking by using an appropriate simulation model. The latter includes the use of back-to-back racks, manual pallet truck and S-shape/traversal routing policy for discrete picking. Subsequently, we present five proposed what-if scenarios using simulation modelling: (a) comparison of manual vs. electric pallet truck using S-shape routing policy for discrete picking, (b) use of a combination of electric pallet truck and five different class- based product storage polices vs. no storage policy (S-shape/traversal routing policy for discrete picking is applied in all five scenarios as well). The results obtained are encouraging showing a reduction of total order picking time that varies between 16% and 20%..

keywords: Class-based storage policies; product picking; electric pallet truck; simulation modelling

# Testing alternative warehouse storage equipment for improving order picking via simulation modeling: The case of a multinational food and beverage company


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## Abstract

Order picking is the most labor-intensive operation in a warehouse and has a direct impact on staff productivity and operational cost. Various strategies have been proposed in the literature in order to influence the performance of order picking such as storage location assignment, routing policies, and order picking equipment. In this paper we investigate the use of alternative storage systems (i.e. live storage racks and conveyor belts) as well as a different picking policy (i.e. zone picking) in a real-life case of a multinational food and beverage company. Initially, we represent the current operation of order picking by using an appropriate simulation model. The latter includes the use of back-to-back racks and S-shape/traversal routing policy for discrete picking. Subsequently, we present two proposed what-if scenarios using simulation modelling: (a) implementation of live storage racks where the total number of SKUs are stored, and a conveyor belt used for supporting zone picking strategy, (b) a mixed solution consisting of a combination of live storage (for A-type SKUs) and back-to-back racks (for B and C-type of SKUs) where zone and S-shape/traversal routing policies are implemented respectively. The results obtained are encouraging showing a reduction of total order picking time that varies between 15% and 40%.


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| keywords: | Simulation models; live storage racks; conveyor belt; product picking |

# Construction Equipment's Residual Market Value Estimation Using Machine Learning


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## Abstract

This study focuses on the identification of the patterns, in which the residual market value (RMV) of construction equipment (CE) is being evolved through time. One of the nine foundational technology advances that Industry 4.0 has brought to humanity is the use of big data analytics, through machine learning techniques. In the domain of CE, this entity of data exists for many decades. Yet, the knowledge that could be extracted from this data is untapped, while great CE manufacturers, owners or dealers, are unstoppably gathering tons of information, concerning ownership, operation and maintenance costs. This study focuses on the ownership cost and more specifically on the identification of the patterns, in which the residual market value (RMV) of CE is being evolved through time. RMV of a machine when sold at any point in its life is an unknown that depends on many factors. This study presents a prediction model for RMV of excavators. A database is created using market information from equipment owners, CE manufacturers, CE auctions and it is used as a "test bed" for the prediction model. The model was developed with the use of RapidMiner Studio software. The results reached a very good level of accuracy in estimating residual market values.

keywords: Construction equipment; machine learning; residual market value; excavator

# Assessing Level of Service in Airport Terminals: a MUSA Approach


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## Abstract

Level of Service Quality (LoSQ) constitutes a key element and performance metric in airport terminals. The LoSQ of an airport is considered to be of primary importance for the attractiveness, operational and economic viability of contemporary airports around the world. The rapidly increasing air travelling public and the associated impacts on passenger service quality have stimulated an increasing attention from both practitioners and researchers in the broader airport community. Service quality and passenger satisfaction analysis have been the subject of numerous research studies, some with special emphasis placed on airport terminals from the perspective of passengers. How service quality is perceived by passengers is subjective to a large extent, since it is a cognitive process incorporating individual experiences and expectations. In addition, it is context-dependent and can be affected by a large variety of factors or service quality attributes. In our paper, we first conduct a Systematic Literature Review (SLR) to identify, critically assess and synthesize the critical passenger satisfaction and service quality dimensions in the context of airport terminals. Then, we propose a multi-criteria assessment framework, consisted of 8 passenger satisfaction criteria and 53 sub-criteria, based on the Multi-criteria Satisfaction Analysis (MUSA) methodology. The proposed assessment framework is demonstrated for Thessaloniki Airport "Makedonia" in Greece. For the purposes of our analysis, 367 structured survey instruments were collected through both physical, on-site interviews and an online questionnaire. Overall, the results revealed non demanding passengers, with a good level of satisfaction. The ranking of criteria in descending order of satisfaction are safety/security, staff, information, comfort, services, mobility and accessibility, facilities and shops/restaurants. The main areas of improvement were indicated for restaurants in terms of prices, facilities with regard to availability and cleanliness, the effectiveness of the baggage claim processes and immigration checks, as well as comfort in waiting and gate areas.


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| keywords: | service quality; passenger satisfaction; airport terminal; multi-criteria analysis; MUSA |

# Analysis of Passenger Satisfaction in Greek Railways: A Multicriteria Approach


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## Abstract

The ultimate goal of transport operators is to ensure high quality of transport services as a prime determinant of passengers' choices. Passengers having a satisfactory travel experience are more likely to use the transport service again, while this can be also critical for the expansion of the existing clientele. This paper aims to develop and demonstrate a generic multicriteria framework for assessing railway passenger satisfaction, which would help railway operators monitor, control and improve the quality of services provided to the travelling public. The proposed framework is built on the basis of 8 first-level criteria (Safety, Cleanliness, Comfort, Ticket Purchase, Information, Reliability and Flexibility, Personnel and Accessibility) and 32 sub-criteria/indicators. The evaluation process was operationalized by means of the Multicriteria Satisfaction Analysis (MUSA) method. The proposed multi-criteria framework is demonstrated for the case of railway passenger services in Greece. The analysis of the results reveals that Greek railway passengers exhibit a quite low overall satisfaction in the order of 33%. The criterion of "Cleanliness" demonstrates the lowest satisfaction rate (11.94%), while simultaneously having the greatest impact on overall satisfaction.

keywords: service quality; passenger satisfaction; railway; multicriteria analysis; MUSA

# A conceptual multi-criteria framework for understanding and assessing a smart city logistics ecosystem


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## Abstract

Taking into consideration the digitalization of everything, global developments and the need for more sustainable and viable cities, there is an acute need for efficient and optimized urban supply chains. Although city logistics traditionally suffered from several operational inefficiencies and practical implementation challenges, mainly driven by the conflicting interests of the plethora of private actors involved and the limited role of public authorities, a new era for city logistics has recently emerged. Under the scope of the EU's policy agenda for CO2 free cities and the promotion of smart cities, many European cities have started actively examining and demonstrating smart city logistics schemes. However, the lack of a thorough understanding of the city logistics ecosystem and the insufficiently explored research area of the smart city logistics ecosystem so far, are essentially hidden behind the lack of a holistic approach on designing a smart urban logistics environment and the fragmented implementation of short term solutions. In response to these gaps, this paper proposes a conceptual multi-criteria framework as a tool for: i) understanding in depth the main components of a smart city logistics ecosystem, ii) enabling the assessment of a city's level of smartness and iii) facilitating the city logistics planning and monitoring process. The proposed framework consists of an extensive list of evaluation criteria, structured in four smart impact areas, namely Government, Economy, Actors and Environment. The selected high-level criteria capture the main aspects of a smart urban logistics system and are further broken down into indicative qualitative assessment questions which constitute the ground basis for initiating a multi-stakeholder assessment process.

keywords: smart city; city logistics; city logistics planning; multi-criteria; assessment framework

# Development and implementation of a Methodological Framework for evaluating alternative sustainable urban mobility measures using Multi-criteria Analysis.


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## Abstract


Since 2013, the European cities were encouraged to support the Sustainable Urban Mobility Policy by developing local Sustainable Urban Mobility Plans (SUMPs). The specific planning procedure should follow the specific guidelines that was launched by DGMove in 2013 and was recently updated. The procedure is based on the "SUMP-Cycle" which specifies four phases and twelve steps of planning.

One of the most critical steps is the assessment of all the alternative measures and infrastructures, which will be proposed by the planning experts, in order to answer to the urban area needs and problems, serving also the determined vision and targets. The evaluation procedure should take into account the opinions of all the interested parties-stakeholders, scientific experts and public- through a cooperative and transparent procedure.

Many problems seem to have emerged during the implementation of the current evaluation process. Especially in countries like Greece, where such form of cooperative decision-making is not usual but also the culture of the stakeholders and citizens is not in favour of "environmentally friendly" mobility and of the corresponding measures and infrastructures, the choice of measures becomes even more difficult.

The aim of the proposed article is to present a methodological framework and some initial results, which was designed for the Greek Authorities, who are currently developing their SUMPs. The framework is based on the Multicriteria Analysis and is targeted to enhance the evaluation procedure of alternative measures and the ranking of them, based on the calculation of a Sustainable Efficiency Index (SEI) for each measure.



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| keywords: | Multicritera Analysis; sustainable mobility; urban planning; mobility measures |

# The Digital Transformation in Public Sector as a response to COVID-19 pandemic: the case of Greece


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## Abstract

Nowadays, countries and industries are facing many challenges due to many technological developments. The public sector in most countries makes efforts to adapt to the new environment and take advantage of the new technologies. Thus, not only do they improve their efficiency but the experience and the satisfaction of their citizens. Some countries have managed to a large extent to adopt new technologies on their endeavor to reduce bureaucracy and improve their efficiency, but some others have still to cover a long distance to reach the desirable outcomes. Greece is a country whose public sector was lagging behind other European countries in terms of technological innovation. However, over the last years and especially the last months, after the outbreak of COVID- 19 pandemic, Greece has taken considerable steps to modernize its operations and protect the citizens and employees from the pandemic. The public sector developed online systems and promoted e-governance, enabling the citizens to gain access to various public authorities without physical presence and the public servants to work and interact with their colleagues remotely. Thus, the citizens could exchange official documents with the authorities such as certificates and prescriptions, reducing bureaucracy, waiting lists, and the risk of spreading the virus. Many Ministries developed new systems as a response to the lockdown due to the pandemic. The Ministry of Citizen Protection and the Ministry of Digital Governance developed a five-digit number in order for the citizens to inform the authorities about their movements, as well as cell broadcast messages sent on all smartphones in Greece with general instructions about the pandemic. Also, the Ministry of Tourism created a digital portal whereby Greece is advertised worldwide throughout the pandemic through videos, virtual guided tours, and testimonials. The data imply that the digital transformation of the public sector is welcome by the citizens.

keywords: Digital Transformation; E-Government; ICT; Public Sector

# Guiding Business Process Change with an Evidence-Based Approach. An Application for the Order2Cash Process in SIEMENS AG


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## Abstract


In every business process change challenge, the identification of potential levers is of critical importance to enable the change. In this work, we claim that an event log, a file that registers the execution of the relevant business processes, can be the source of such an enabler and that it is capable to provide insightful recommendations. We propose the creation of a bipartite network, involving organizations and behaviors, through an event log, to capture the prospects of both organizations and behaviors for process improvement. We present how the structure of such a bipartite network can reveal the "operations sophistication", which in turn exposes the process improvement potentials.

We define the operations' sophistication based on the hypothesis that the most prosperous organizations execute their processes more efficiently, not because their managers and employees are individually brilliant, but because these organizations hold a diversity of knowhow and because they are able to recombine it to create a larger variety of how they respond to the process needs. This hypothesis is equivalent to accepting that flexibility at the operational level is critical for the firm's performance.

In this work, we discuss that this flexibility can not be directly linked to any particular capabilities or knowledge and that it is impractical to identify all the relevant capabilities for every behavior, nevertheless, we can still indirectly anticipate them through an event log. The implications of this premise are very important since we can exploit the event log of a business process to a) Pinpoint process behaviors that contribute to better performance; b) Facilitate change through recommendation for the most feasible process improvement paths; c) Suggest a prioritization considering the performance improvement potentials. We test our model through a real dataset from the Order2Cash process in SIEMENS AG.



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| keywords: | Business Process Change; Process Mining; Business Process Analytics; Bipartite Network |

# Exploring the Complex Dynamics of Business IT Alignment

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## Abstract

Aligning business and IT in organisations is an enduring topic in literature. Despite a considerable body of research, business IT alignment is still considered as an unachieved objective in corporate practice. Literature has extensively studied the several factors influencing alignment, however, their inter-relationship in a time perspective has been largely under-investigated, leading to ineffective alignment actions. Based on a complex systems interpretation of the company and on a view of alignment as a co-evolution process, we propose a mathematical model that describes how alignment evolves in an organisation. The design of the model is based on 3 case studies, that provided insights on the relationship among the key factors influencing alignment. Simulation of the model shows that alignment is a complex process, where the number and type stability of the equilibrium states change according to the values of the model's parameters, and complex oscillatory regimes are possible. The alignment dynamics exhibited by the model was compared to data collected in the cases to prove, qualitatively, the model's validity. The contribution of the study is both theoretical, as the model simulation improves our understanding of the alignment process, and for practice, as the analysis of the alignment dynamics provides indications to improve the efficacy of alignment actions in organisations.

| keywords: | Business IT alignment; complex systems dynamics |
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# A fairer assessment of DMUs in a generalised 2-stage DEA structure


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## Abstract

Data Envelopment Analysis (DEA) is a well-established approach for evaluating the performance of Decision-Making Units. Single-stage and serial 2-stage systems within DEA, have constantly used various methods to attain fairness in the evaluation outcomes. Little work, however, has been done addressing this challenge in a generalized 2-stage structure with additional inputs in the second stage and part of intermediate measures as final outputs. In this paper, we argue that fairness, or the acceptance of evaluation and ranking by the different DMUs and stages, is improved by increasing measures related to the degree of discriminatory power, the weight scheme, the Pareto optimality condition, and the use of a common set of multipliers. We also intend to provide a mechanism that gives prominence to a more contemporary concept of fairness about diversity and inclusion of minority opinions. The latter aspect has, to our knowledge, not yet received explicit attention in the methodological development of DEA. To this end, we propose a novel combination of a Goal Programming-Multiple Criteria DEA (GP-MCDEA) model, the CRiteria Importance Through Inter-criteria Correlation (CRITIC) method, and the Nash bargaining game theory to achieve the aforesaid aspects of fairness in DEA and thus a better degree of cooperation between stages of a DMU and among DMUs. The GP-MCDEA model, in particular, seeks for peer evaluation whereby each peer aims to evaluate the worst of the other players in the best possible light. The application of the CRITIC method to DEA, which is by itself novel, alternatively addresses the aggregation problem within the cross-efficiency concept. Finally, the relational Nash bargaining game efficiency model ensures Pareto optimality for the system, as well as arrives at a common set of multipliers for each of the flows. A numerical experiment illustrates the applicability of the proposed models leading to more representative results for the units.

keywords: Data envelopment analysis; two-stage; fairness; CRITIC; Nash bargaining

# A case by case dual sourcing inventory model subject to different types of supply uncertainty


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## Abstract

Supply uncertainty is a common phenomenon causing not only firms operational problems but also social problems. Many mitigation and contingency strategies have been studied extensively in the literature, highlighting the importance of efficient inventory management (i.e. safety stock, split order among multiple suppliers, use a backup supplier). Usually, using a mix of these strategies is preferable as it can lead to significant cost reduction and maintenance of firm reputation and improve stock management. Consequently, many researchers have studied the option of having a primary unreliable supplier with supply disruption risk and a backup, reliable, but more expensive one, in case of supply disruption in the primary. However, in many cases, the backup supplier may procure counterfeit or imperfect quality items. For example, during COVID-19 pandemic, Spain announced that it would return 640000 rapid testing kits it had imported, as (after tests on a batch) had found them to have a 30% defection rate (https://www.euronews.com). In the present paper, an inventory system where the supply process is subject to two types of uncertainty, imperfect quality and disruption, is studied. The supply from the primary supplier is subject to sudden interruptions, so, in case of disruption, a backup supplier is used in order to prevent shortages. However, a batch from the backup supplier may contain a random percentage of counterfeit or imperfect quality items that are detected using a 100% and error-free screening process. The objective is the minimization of the total cost of the system per unit time, which is derived using renewal theory. Through theoretical and numerical results, the impact of the quality uncertainty in this mixed type strategy is examined.

keywords: Inventory; Counterfeit; Imperfect; Disruptions; Supply uncertainty

# Truck Loading for Fuel Distribution with Axle Weight Restrictions


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## Abstract


The specific work aims to address a novel tank truck loading problem that incorporates explicitly safety restrictions applicable during loading and unloading of Hazardous (liquid) cargo on tank trucks. The loading restrictions under consideration aim to enhance vehicle's stability and to avoid overturns, which in most of the cases are caused due to the unbalanced cargo loaded on the vehicles. In order to ensure stability and respectively to avoid incidents caused by overturned vehicles, truck manufacturers and each country's transportation authorities provide restrictions concerning the maximum weights limits of each truck (i.e. max. gross weight, max. weight distributed over each axle). The innovation of our model comes from the explicit incorporation of balance constraints, that respect these weight restrictions during loading a tank truck with more than two axles. In the balance constraints we have incorporated accurate calculations of the weights distributed over each axle of the tank truck based on advanced structural analysis. Consequently, our loading model has the ability to build a loading plan (assignment of order items to the tank truck's compartments) that respects the balance constraints throughout the entire delivery route of the truck.



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| keywords: | Vehicle routing; Truck loading; Axle weight constraints; Stability; Hazardous materials; Theorem of three moments |

# UNESCO Chair Con-E-Ect: Promoting Riparian Areas and Deltas Sustainability


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## Abstract

Riparian areas and deltas are unique ecosystems and ecotones (transition zones) between the aquatic and terrestrial ecosystems. Their uniqueness leads to the many unique ecosystems services they offer and is the reason why they have been utilized for thousands of years. This has led to their degradation and if you take into account that the majority of the people are congregate in or adjacent to riparian areas and deltas their conservation and preservation has become a main priority worldwide Finally, climate change is expected to severely impact these two ecosystems. These are the main reasons why the UNESCO Chair on the Conservation and Ecotourism of Riparian and Deltaic Ecosystems (Con-E-Ect) was established at the International Hellenic University in May 2016. The objective of Con-E-Ect is to collaborate with national, regional and international organizations and stakeholders, in order to develop an International Common Strategy Framework for the Conservation and Ecotourism of Riparian and Deltaic Ecosystems. Con-E-Ect is focusing on the following Sustainable Development Goals (SDGs): Clean Water and sanitation, Life on Land, Life Below Water, Climate Action, Quality Education, Sustainable Cities and Communities and Partnership for the Goals. Con-E-Ect is accomplishing its objective and SDGs through innovative research, dissemination activities, training and awareness events for various target groups. Through these activities, Con-E-Ect wants integrated water resources and ecohydrological principles, ecosystem based and ecotourism approaches, and nature-based solutions to be adopted by policy makers, water managers and stakeholders for the sustainable management of these ecosystems. In addition, it is built partnerships with government agencies, organizations and municipalities of the region while also participating in EU funded projects. The awareness on the importance and best practices to conserve and maintain riparian areas and deltas in Greece and in the region has steadily increased.


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| keywords: | Sustainable Development Goals; Ecosystem Services; Integrated Water Resources Management; Ecosystem-based Approaches; Nature-based Solutions |

# Assortment of needs and prospects for developing an intelligent services system in transport sector


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## Abstract

Modern business management based on dynamic risk analysis and combination of real time data towards operational efficiency on one hand; and corporate management performance on the other. This paper deals with the analysis of the real requirements for digital services to support policy making, strategic and business planning and decision making in transportation sector. Key objective deals with the determination of the needs for a data driven management system (platform) upon the development of intelligent services to support decisions in sector of transportation. The research outputs based on the results of a questionnaire survey addressed to transport and logistics sector, providing results about the real needs for data analytics, event observation, cost-benefit analysis, market trends and forecasting, for a variety of potential users in supply chain business ecosystem. Adopting a System of System (SoS) approach the utility of data driven service in the real business is addressed considering each transportation system capabilities and network capacity constraints. Special emphasis is given to analyze the content, define the expectation and utilize the need for the development of an intelligent combined data driven system addressing the system utilization for the different group of potential users' expectations, prospects, organizational structure and governance. Conventional wisdom is to provide state-of-the-art research outputs for managers, planners and decision makers towards business intelligence and corporate strategy in transportation sector.

Acknowledgement: The paper research outputs is supported by the research project "«ENIRISST – Intelligent Research Infrastructure for Shipping, Supply Chain, Transport and Logistics") which is implemented under the Action "Reinforcement of the Research and Innovation Infrastructure", funded by the Operational Programme "Competitiveness, Entrepreneurship and Innovation" (NSRF 2014-2020) and co-financed by Greece and the European Union (European Regional Development Fund).

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|---|---|
| keywords: | Transportation analysis; decision making in Transportation; decision support services; supply chain management; business intelligence |

# Assessment methodology and outputs towards sustainability and resiliency in transportation


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## Abstract

The Paris Climate Agreement in 2015 provided an opportunity for countries to strengthen the global response to the threat of Climate Change by promoting the need of emissions mitigation. Subsequently, the United Nations' 2030 Agenda for Sustainable Development promote a series of 17 Sustainable Development Goals, which adopted by all UN Member States the same year. Hence, the subject of sustainability is crucial for the modern world, where economic and social activities focused on changes to achieve prosperity and be resilient. The necessary condition, that is, ensuring economic, social and environmental sustainability, also affects the functioning of critical organizations and businesses, especially for the transport sector which is a key pillar of any economy. Global sustainability challenges are shaping the way business operates in the 21st century. Businesses are under increasing pressure from multiple stakeholders (e.g. shareholders, customers, employees, society) to manage their positive and negative impacts with clear responsibility and strategic intent. In this paper, the methodology framework deals with analysis of risk assessment and transport business performance evaluation towards their ability to meet the goals of sustainability. Conventional wisdom is to evaluate rate of management response and how corporate actions can be best configured to promote responsible and sustainable business strategies which is a major challenge for planners, managers and decision makers.


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| keywords: | Transportation Analysis and Decision Making; Environmental Design and Policy; Environmental Impact Assessment; Governance and Policy measures; Business resiliency; Risk analysis and management; Supply Chain Management and Logistics |

# Air transport network development effects on property values and real estate


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## Abstract


Transportation infrastructure development in urban areas has significant impacts on land use, residential and commercial property values. Property values are interrelated with investment of transportation infrastructure such as airports since such transportation investment improves connectivity and tourism development, a key factor for real estate development. While there have been several recent studies on the impacts of transport especially of rail and public transport, upon residential and commercial property values, there has been little research on the impact of airport development on property values and especially on tourism residential property values.

The main objective of this paper is to evaluate the effects of airport development in terms of traffic and air connectivity improvement on property values. The methodology framework use panel data to measure the variation on value changes from properties because of air traffic growth and improvement of airport connectivity. By a systemic approach the key factors affecting property values are given and an econometric modelling approach using price variables are constructed, providing the elasticity of price towards clusters of international traffic at airports.

The panel data analysis model applied to estimate the tourism residential price elasticity based on random effects (RE) modelling. The modeling framework will test the sensitivity of the hypothesis that improvement of air traffic and air connectivity has an impact on the property market of the airport catchment area. Panel data increases the possibility of violating the statistical assumptions need to provide reliable inferences. The numerical application is Greece, where using the panel data for the different properties across AthensInternational Airport catchment area for last year, provide evidence of the relationship between the real estate value changes and air connectivity improvement.



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| keywords: | Management Science in Travel and Tourism; Operations Research in Travel and Tourism; Risk Analysis and Management; Statistics to define market prices; Pricing policy; Location Analysis |

# Dual level assessment framework to evaluate feasibility and support decisions for the development of Natural Gas distribution facilities


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## Abstract

This paper deals with the sustainability assessment to evaluate feasibility of Natural Gas distribution facilities projects in terms of economic, social and environmental issues affected the decision process and the project development strategy. By a system of system approach key cost and benefits variables are highlighted and a series of key performance indicators are presented. The evaluation framework based on balance scorecard to define the level of compliance with local socioeconomic expectations and project financial viability and attractiveness. Conventional wisdom is to present a coherent and easy to handle assessment framework appropriate to provide essential results to decision makers and investors towards Natural Gas distribution projects resiliency and sustainability.


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| keywords: | Energy Management; Energy Policy and Planning; Environmental Impact Assessment |

# Economic impact analysis to air transport due to pandemic Covid-19


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## Abstract


Air transport and economic development interact with each other as aviation makes significant direct and indirect contributions to the economy and increases the cycle of economic activity. Due to Covid-19 pandemic, air transport sector could experience a huge reduction of direct and indirect contribution in economy. Given that demand for air travel is falling dramatically during the Covid-19 pandemic, not only among tourists but also among business travellers, as many travel restrictions come into force, it is crucial to provide an assessment of the impact of Covid-19 on the air transport sector in Europe and its domino effect in air transport sector in Greece.

Key challenge in this period of economic downturn with travelling restrictions, is to increase Greece share of the Mediterranean tourism market and support Greece's ability to achieve high income from air transport activities including direct, indirect and induced impacts, which are related to the total revenues of the air transport industry as well as the enabler of the spin-off effects on tourism – which plays a key role in promoting economic growth in Greece.

The purpose of this paper is to provide quantitative estimations on the economic effects of air transport due to Covid-19 pandemic. This paper focuses on the estimation of the air transport footprint in terms of socioeconomic impacts in national economy. The socioeconomic effects assessment concept and methodology are given, providing an essential tool for stakeholders and decision makers. The numerical application is Greece, which is an extremely attractive summer holiday tourist destination in southeast Mediterranean, being very highly affected by the air transport and travel restrictions due to COVID-19 pandemic.



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|---|---|
| keywords: | Management Science in Travel and Tourism; Risk Analysis and Management; Mathematical Modeling and Decision Making; Air Transport; Economic impact analysis; Covid-19 pandemic |

# A methodological framework to identify and handle rank reversals of the alternative actions in Disaggregation – Aggregation Approach


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## Abstract


The Linear Program of UTA methods in Disaggregation – Aggregation Approach usually leads to the estimation of infinitive compatible additive value preference models based on the Decision Makers global Preferences expressed in a limited set of alternative actions. The estimated compatible preference models are bordered into a curved hyper polyhedron. One of the main issues of the low robustness constitute the fact that rank reversal are presented among the alternatives of the whole set of the alternative actions in the extrapolation phase for the different compatible preference models.

This research work focused on the identification of the rank reversals of the alternative actions based on: a) the tomographical technique with which cutting hyper polyhedra of the curved hyper polyhedron are identified in the frame of picturing the low robustness and b) a set of indices based on the Kendall's τ and Sanon's Entropy in order to measure the rank reversal totally as well as for pairs of alternative actions. The analysis of the estimated indices leads to focused feedbacks of the initial steps of UTA methods aiming to clarify DM;s preferences and to the assessment of additive value preference models of higher robustness. The proposed approach is illustrated through a case study and the software developed for the scope of this research.


keywords: Multicriteria Decision Aid; Decision Support Systems; Robustness Analysis

# Ranking of importance of the most important social media platforms in hospitality and tourism


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## Abstract


Tourism is the "heavy industry" of Greece as it is the main pillar of the country's economic development. It is now a fact that in recent years The use of the internet and social media usage, have diversified the way a business promotes its services to consumers. The development of online promotion combines the use of modern technological platforms, like the social networks (Facebook, MySpace, LinkedIn), blogger blogs (WordPress), micro-blogging (Twitter) and wikis (Wikipedia, Wikinews). By having that in mind the specific work aims to examine the use of social media in the hospitality industry in terms on analyzing the impact to consumer decision making perspectives.

In doing so, we have collected data from Greek tourism entrepreneurs, where they ranked and assessed the relative importance of the main social media platforms in order better to understand the impact they have on the consumer decision-making process. To that extent, we have used the methodology of multicriteria analysis, and specifically the outranking method PROMETHE II. Finally, a thorough discussion and conclusions are given to different research practitioners and policy makers.


keywords: Tourism; digital marketing; social media; PROMETHEE; Greece

# Finding the Best Path in HR Satisfaction by Using Structural Equation Modeling, Bayesian Networks, and Decision Trees


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## Abstract

Every company searches, implements, and invests in new, more effective, and more efficient ways to recruit new personnel. They use any methods available, like conducting consecutive interviews, using different kinds of testing environments and programs, searching thoroughly the candidates' practical and theoretical knowledge, testing hard, soft, and digital skills, etc. All these ways are costly for companies because they should make absolutely right decisions about human resources selection in order to maximize the efficiency of selection procedure. This paper explores the ways that a company should make such decisions, by using machine learning methods; the paper also provides new sets of skills, so that a company would select the most suitable candidate. To do this, decision trees are used, which is a machine learning algorithm that analyzes the data concerning human resources selection and produces a graphic tree about key point decisions that should be made, depending on some specific values and bounds of different kinds of metrics, which actually help the company decrease its expenses and increase its performance. Furthermore, an effort was made to assess the impact that a new kind of tests will have on human resources' ways of selection. Creating tests that measure a candidate's intelligence on different kinds of fields, such as spatial, verbal, intrapersonal, interpersonal, and even digital intelligence, can possibly show the best candidate. Factors, like the likelihood of successful training with the minimal cost and in the shortest time period, and the possible working performance development, are important areas in this research. It is considered that this work will have a strong impact on how candidate testing and selection should be done. To the best of our knowledge, there has not been, so far, a work to relate machine learning with human resources selection.


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| keywords: | Machine learning; Decision trees; Human resources; Smart employee selection; Digital intelligence |

# A methodological approach for minimize the transportation cost-time regarding responses to natural disasters


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## Abstract


The research work is intended to be a deterministic approach which minimizes the cost-time in a transportation problem. The most adequate way for the optimization of a transportation problem is to utilize a Linear Programming methodology. So, the problem is modeled as a Multi Objective Linear Programming (MOLP) problem which we know exactly the demand, the supply and the transportation cost-time per unit.

In this paper a real world application of a transportation problem involving the transfer of patients, concerning a disaster to the nearest Hospitals with Intensive Care Unit (ICU). This case has three distinct features. The first one refers to the limited transportation resources (ambulances) which leads to multi transports of the ambulances, the second is related to the different significance and emerging of the patients which provides a need for prioritization of the cases and the last to the limits resources of the ICUs in the hospitals located in different areas. The MOLP proposed approach was implemented utilizing Excel Solver.



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| keywords: | Multi Objective Linear Programming; Transportation Time; Optimization |

# Robust Optimization Approaches for Portfolio Selection: A computational and comparative analysis with statistical guarantees


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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 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 mean-variance model), incorporating uncertainty through a formal and analytical approach into the modeling process. Robust counterparts of existing models can be considered as worst-case re- formulations 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 comprehensively. 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. To convey constructive information, additional experiments are performed to evaluate the statistical properties inferred with the RO framework.


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| keywords: | Robust optimization; Portfolio selection; Financial Engineering; Decision making under uncertainty business performance |

# Strategic Value of Big Data and Business Analytics


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## Abstract


The vast increase of data from different sources and in various forms has increased researchers' interest in big data and business analytics. At the same time practitioners try to share knowledge, improve decision-making and support strategic planning through data analysis techniques. Although numerous studies have been conducted on the success or failure of big data analytics techniques and the resources a business needs to invest in them, there is little research on their strategic contribution.

Big data is characterized by 4V's (volume, velocity, variety, and veracity). In recent years, researchers have added a fifth, the value that results from this data. The success of big data projects and analytics techniques in business requires not only the right infrastructure, analysts, knowledge and tools to manage big data, but also turning them into strategic value for businesses.

The proposed paper firstly provides a literature review to highlight the theoretical and practical contribution of the strategic value of big data for businesses and to define the individual concepts that characterize this area. The methodology followed for the implementation of the literature review is that of Webster and Watson (2002) which has been applied to a variety of research in the field of Information Systems. Based on the above, a theoretical framework of strategic value of big data for SMEs is formed. The empirical validation of the framework will be tested through an online survey for Greek SMEs.



| keywords: | Big Data; Business Analytics; Strategic Value; SMEs; Online survey |
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# Water resources management optimization based on tradable water permits


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## Abstract

It is commonly accepted that fresh water is a key commodity for the proper and effective functioning of modern societies. This fact combined with the limited availability of water, the increasing competition among its users and mainly the publication of the Directive 2000/60/EC by the European Union which recognizes water not only as a fundamental social good but also as an economic good, has created modern challenges relating to the management of that natural resource. Thus, research attention has recently focused on the search of economic tools and on the investigation of the possibilities of applying those tools to water resources management in order to address the challenges mentioned above. Tradable water permits are one of those tools. At the same time, recent studies show that even though the application of operational research models, and especially of optimization models which is the most widespread technique of that, is quite prevalent in water resources management problems, studies that address modern challenges are still absent from the relevant literature. Those challenges require integrated solutions that combine the minimum cost for the organization that manages the water resources with the maximum benefit for their users and of course with the rational and sustainable use of the resources. The present work falls into that framework, since it introduces an optimization model based on the tool of tradable water permits which attempts to ensure the optimal allocation of water quantities among competing users, incorporating economic and environmental parameters into that.

keywords: water resources management; tradable permits; optimization; competing users

# Financing Sustainable Energy Efficiency Projects: The Role of Stakeholders


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## Abstract

Energy efficiency finance is considered of outmost importance for the achievement of the European Union's (EU) energy and climate objectives for 2030 and beyond. However, it remains a challenge how to identify which investments could foster sustainable growth, while also having the capacity to meet their commitments from the first stages of investments generation. In the meanwhile, stakeholder engagement is becoming an important component aiming to enlighten the gap of all policy and decision support processes. The aim of this study is to develop a concrete methodological approach that aims at involving highly relevant stakeholders, gathering their input and/ or training them in terms of energy efficiency financing. The key actors are identified among all the relevant stakeholder groups, while their roles, interest, motives and power are analysed. The main challenge to be addressed towards this direction is how to ensure the necessary consultation with financial institutional bodies and market operators at national and EU level, which is fundamental for achieving a successful finance of energy efficiency projects. Finally, the study could serve as an analytical guide on the development of a stakeholder engagement plan that could effectively exploit the broad scope of the financial instruments and various experiences of the market actors including their required knowledge and skills towards the energy efficiency investments financing.

| keywords: | Energy and Climate Policy; Energy Efficiency Investment; Decision Support; Stakeholder Engagement |
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# Quantifying Enterprise Coherence – A Design Based Comparison Of Calculation Methods


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## Abstract

Coherence between various enterprise facets is essential for optimal performance. A quantitative expression for enterprise coherence has therefore the opportunity to function as a leading indicator for enterprise performance, but is currently lacking. This research focuses on the quantification of 'enterprise coherence', in order to aid enterprise architecture governance and realize more sustainable enterprises. The Enterprise Coherence Index (the EC-index) to measure enterprise coherence is proposed. Design development of the EC-index is guided by a well-established design science methodology. One of the identified components of the EC-index is an enterprise coherence calculation engine. The enterprise coherence calculation engine requires a quantification method in order to calculate coherence. Quantification models from different domains exist. Four different candidate quantification models are selected, and the selection is made plausible through a literature overview based on key search terms. All approaches are based on a graph model. For the domain of the enterprise a bipartite network of 'direction statements' versus enterprise decisions is chosen. To aid in developing the EC-index, quantification methods are compared with data from two historical cases. It is shown that some models can already be eliminated based on these cases, and that other methods can be unified. It will be shown that coherence contribution of individual decisions can be expressed as a number, based on their supportiveness of the enterprise's purpose. This paper aims to contribute to the domain of governance and policy modeling as well as to organizational decision making.


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| keywords: | Architecture Governance; Enterprise Architecture; Enterprise Coherence; Enterprise Coherence Index; General Enterprise Architecting; Quantification of Coherence |

# MILP model for production scheduling and lot sizing


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## Abstract

Optimization of production process represents a critical component for competitive success. In this paper we focus on production of micronutrients for animal consumption. A Mixed Integer Linear Programming Model (MILP) is proposed for simultaneous optimization of production planning and scheduling a set of parallel production units. Continuous production process is characterized by a number of products sorted in different product families. The model explicitly considers changeover cost and changeover time through a matrix of compatibility between product families as well as capacity limitations of different production units. For a given set of orders composed from quantity of products with respective deadlines the aim is generate an optimal production plan taking into account the production, changeover and capacity utilization costs. Inventories and backorders are not permitted. The model is applied to a case study that considers optimal lot size and schedule of five parallel machines over a 7 days planning horizon in order to meet the weekly demand for six products that belong to five product families. Obtained results prove the superiority of proposed approach in comparison with the current practice.

keywords: lot sizing; scheduling; mixed integer linear programming

# A multicriteria decision aid approach for measuring innovation performance


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## Abstract

The assessment of countries' innovation performance is highly significant in the context of efficient policy making. The European Innovation Scoreboard (EIS) provides the Summary Innovation Index, a composite indicator for the evaluation of EU Member States' and selected third countries' research and innovation performance. Composite indicators are commonly used for the aggregation of complex or multi-dimensional processes into simplified concepts. Referring to national policies, they are frequently used for ranking countries in terms of innovation and entrepreneurship performance. However, there is controversy in regards to their credibility that mainly stems from the adopted normalization and weighting schemes. Due to these concerns, the approach of multiple criteria decision aid (MCDA) is leveraged as an alternative to construct rankings. The paper applies the PROMETHEE II (Preference Ranking Organization Method for Enrichment Evaluations) method in order to revisit the rankings of the EIS 2019 report. For each year, multiple scenarios corresponding to different values for the PROMETHEE II parameters are considered, while visual representations for the analysis of PROMETHEE II outcomes are included. Furthermore, sensitivity analysis on the criteria weights is implemented. The differences among EIS and PROMETHEE II rankings are identified and analyzed, while valuable insights for policy measures on national level are provided.


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| keywords: | Innovation Performance; MCDA; PROMETHEE II; European Innovation Scoreboard; Composite indicators |

# Essential Digital Technologies for Achieving Digital Maturity in the Fashion Industry


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## Abstract

Organizations try to integrate digital elements into every aspect of their business to enhance their digital presence and operations . The majority of the organizations invest in a variety of digital technologies to improve the offered customer experience, business operations, and business model. Digital strategy sets the directions of which investments should be made and how digital technologies are going to be used during this digital transformation Thus, digital technologies investments the integration are equally important parts of digital transformation. Investments in digital technologies have been made in every industry; however, the fashion retail industry was among the first industries that started a digital transformation process by investing in digital technologies and responding to changing customer preferences in order to improve their experience. The most common technologies that have been used in fashion retailing are Social, Mobile, Cloud, Artificial Intelligence, Internet of Things, Virtual Reality, Big Data and lately blockchain. We choose to focus on the fashion retail industry because digital technologies have caused significant changes in it. This research aims to identify the main digital technologies that have been used for the industry's digital transformation and to summarize their main applications and impact. This will help organizations and managers to select more suitable technologies according to their digital strategy during digital transformation and prevent misplaced investments. During digital transformation, financial resources are an important parameter that determines the number of changes that can be occurred in the organization and the number of investments. Thus, our research will help organizations invest in rising and relevant digital technologies for the fashion retail industry.


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| keywords: | Digital Transformation; Digital Technologies; Mobile; Cloud; Artificial Intelligence; Internet of Things |

# An Exploratory analysis of the use of ICT by Greek households through official statistics

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## Abstract

The use of technology by households has undoubtedly increased significantly in recent years. The advancement of technology itself is an important factor influencing the use of technology goods for either consumer or capital purposes. There are, nevertheless, additional factors that can change the behavior of technology users, including economic, political and social developments. Economic transformation and e-commerce, public sector administrative and digital reforms, the evolution of forms of communication but also emergency situations such as natural disasters and disease management play an important role in how people use technology. The aim of this paper is to present an exploratory analysis of how individuals used information and communication technologies through official statistics such those compiled by the Hellenic Statistical Authority (ELSTAT) between the years 2009 to2018. Our work highlights the prevailing trends and groups of users which took place in a time span where the Greek state underwent significant economic and political change.

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| keywords: | Exploratory statistics; Hierarchical Clustering; Information and Communication Technologies; Households; Official Statistics |

# A Second Order Multi-Class Macroscopic Traffic Flow Model With Time Varying Parameters for Environmentally Sustainable Coordinated Ramp Metering Control


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## Abstract


The design of motorway network-wide traffic control strategies should be optimised to address (a) environmental poli- cies for achieving hot gas emissions targets in areas of interest (b) traffic efficiency in the sense of overall network congestion reduction and (c) equity towards all users, i.e. fair distribution of delays to all drivers using the infrastructure capacity. Ad- dressing environmental impact explicitly in control design and not implicitly addresses needs generated by the increasing environmental concerns over vehicular traffic emissions. The fact that the environmental impact of each vehicle depends on its class (passenger cars, light vans, trucks or heavy occupancy vehicles) has lead to the development of multi-class macro- scopic traffic flow models that explicitly model vehicle class flow dynamics. The approach followed here is the introduction of partial densities and queues per vehicle class and the development of a mechanism for averaging the model parameters as a function of traffic class composition. Based on the developed model, optimal decisions about possible control actions can be taken. In this paper we are proposing a second order multi-class macroscopic traffic flow model with time varying model parameters. Time variability is explicitly considered by use of sigmoid curves over traffic class-composition. The result is a multi-class traffic flow model, which allows the design of MPC for various motorway traffic control measures. The problem of coordinated ramp metering is examined and an optimisation problem is formed for obtaining environmentally sustainable, efficient and equitable coordinated ramp metering strategies.



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| keywords: | macroscopic traffic flow models; traffic control; hot gas emissions; ramp metering; transportation |

# Determinants of User Satisfaction with a Justice Information System


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## Abstract

Information and Communication Technologies (ICTs) have been increasing in the public sector during the last decade. The adoption of ICTs in e-government and particularly in courts offers many benefits and more effective services for citizens and users. Information Systems in justice increase engagement and communication between different actors and support lawyers and judges in streamlining their day to day work. In addition, Information Systems in the justice sector have encouraged the development of new working practices and organizational procedures to improve the performance of the court. Several court management scholars and practitioners have paid attention to this field, and the money spent on improving the performance and output of court staff has increased, studies that examine the acceptance and user satisfaction of Information Systems in the justice sector are limited. Consequently, the purpose of this paper is to examine the factors affecting user acceptance and satisfaction of Information Systems in the justice. Data was collected by 125 lawyers in Greece. Regression Analysis on the detailed items of user acceptance and satisfaction constructs was applied. The findings of this paper denote the attention given by lawyers to the dimensions of system quality, information quality, perceived usefulness and perceived user friendliness. In addition, this paper is useful to judicial authorities and practitioners to design these systems more efficiently and to consider these variables closely in the design and use of court systems.


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| keywords: | E-justice system; Information Systems; Satisfaction; Success; Information Systems acceptance |

# Social networking services and travel information: Evaluating users' perceived value and trust


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## Abstract

Social media platforms are used by consumers in order to share information, pictures, and videos. Social networking is a new way for customers to interact, communicate and build relationships among them. Especially in the tourism industry, social media have changed the way tourists search, read, handle and trust information and help them to collaborate in order to produce information for destinations. Tourists create the content of social media by reading, using and sharing information before, during and after their travel. User Generated Content (UGC) is a significant tool for tourists in order to share information and make travel decisions. By sharing travel encounters through content, pictures, and videos, clients improve the free data accommodated potential travelers with respect to new markets, new subjects and sensitive issues. Feedback giving by customers through UGC is fast, up-to-date, and available everywhere and it is a way of word-of-mouth in the digital age. Potential customers spend time reading online reviews and communicate with other travelers because they attempt to be satisfied by their travel planning decision. Thus, it is important to secure privacy and trust for users when they share travel information. However, more research concentrating on consumer behaviour specifically in respect of trust-based aspects, privacy concerns, and other associated prevalent issues. Therefore, the purpose of this paper is to examine the factors influence users' perceived value and trust in acquiring travel-related information from social networking services. Data were collected from Facebook users that have shared travel information and analyzed using Regression Analysis. This

paper contributes to social networking services users' behaviour and provides managerial implications to boost more acquisition of travel information from social networking services.

keywords: Social networking; Travel planning; User generated content; Perceived value; Trust

# The Effects of COVID-19 in the European Airline Industry. Results from PEST Analysis.


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## Abstract


The impact of the Covid-19 outbreak is huge and rapid for the European airline industry. International and domestic traffic in European airports reduced dramatically. On the private sector, a few companies couldn't continue operating and went bankrupt. A large number faced economic problems and many of them reached out to the public sector for aid. Only a handful of them found ways to fight back.

This paper proposes a Research Framework for the European Airline Industry, in a coronavirus-safe environment. Choosing qualitative research approach, this paper utilizes data collection as a research method for performing a PESTE analysis, in order to analyze the state of the European airline industry.

The analysis of current political, economic, social, technological and environmental factors, in the reality of the Covid-19 threat, leads to the conclusion that the European airline industry is in an unprecedented situation and needs radical changes. The political and social aspects of PESTE Analysis indicate that European Community is ready for bold changes in favor of the public health and safety.

Technology is a crucial ally against Covid-19 with digital innovations but it has to respect personal data especially when it comes to mobile applications. Governmental and Health organizations, can lead private sector to change their way of thinking and to quickly adopt new modes of operation, especially in the event of another outbreak. Further investigation of the impact of Covid-19 in the airline industry in every European country is recommended.

| keywords: | Covid-19; Airline Industry; Europe; PESTE Analysis |
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# A Framework for Implementing PROMETHEE II in GIS-assisted Suitability Analysis


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## Abstract

Site selection, site suitability or land use suitability aims to investigate the degree of preference of a land use type to all the feasible locations in the examined area. Its role is vital to assist planning processes and investment decisions for both public and private sector. It is widely accepted that suitability analysis consists a multicriteria analysis problem since the most appropriate sites are identified through the evaluation of a large number of alternative locations and involves multiple usually conflicting criteria and constraints. Multicriteria decision making methods (MCDM) are widely applied as the most appropriate tools for site screening problems. The spatial nature of suitability analysis resulted to the development of synergies of MCDM methods with Geographic Information Systems (GIS) due to their capacity to manage, handle and retrieve spatially related data types. However and beyond their renowned abilities GIS implementation lack of appropriate tools for handling decision maker's preferences. As a result, a discrete research field of Spatial MultiCriteria Decision Analysis (SMCDA) has emerged aiming to combine MCDM and GIS overlay map layering capabilities. Although a numerous amount of research papers has been published the presence of outranking relations methods (e.g. PROMETHEE, ELECTRE) remains scarce when large raster datasets are involved into the analysis due to computational limitations derived from the need to compare in pairs every candidate location. To overcome these limitations the current paper presents a framework that enables PROMETHEE II implementation in raster-driven GIS-based land suitability analysis. The proposed framework provides the guidelines for a variety of net preference flows estimators using both total and per criterion net preference flows for a sample of alternatives. Then these estimations are interpolated for every examined location implementing Toblers's first law of geography.


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| keywords: | Suitability Analysis; GIS; MCDA; PROMETHEE method |

# Strategic management in the season of Covid 19. Case studies from the region of Thessaly


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## Abstract

The appearance of Covid-19 and its rapid spread created new data in the structure, organization and operation of many businesses. Many of them were forced to suspend their operations temporarily, others were forced to underperform, and there were those who suspended their operations permanently. The above conditions created new forms of work such as teleworking. Electronics stores have quickly adapted to the new requirements in an effort to meet the ongoing needs of their customers. The proposal will approach case studies from major electrical appliance stores operating in Greece and in particular in Thessaly. Data collection will be used through an interview and the study of secondary sources. An extensive report will first be made on the new data that emerged due to the pandemic, and then the ways in which these companies have dealt with and adapted to the new situation will be reported. The aim is to present the future situation and the changes that will take place in the management of human resources with the use of technical science. The findings are expected to help inform business executives so that they can operate more securely and more efficiently in the new management system. In the same way, companies will be able to better organize the current situation and face any difficulties that arise.

keywords: Technology; Teleworking; Business Environment

# Open Source BPMS for the Public Sector: A case study


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## Abstract


Despite the technological dominance in almost every aspect of the business world, it is a fact that many businesses lack of process automation, leading the employees to work inefficiently, wasting time in repetitive, sometimes even unnecessary procedures. In this context, there is a great loss in the business' revenue and the available resources are not properly distributed. This lack of automation is apparent in the Greek Public Sector, where the technological integration remains at a very low level. The purpose of this research is to point out the importance of Business Process Management and how Business Process Management Systems can be adapted in businesses in an attempt to improve its performance.

More specifically, this paper describes how an open-source Business Process Management System can be used in a public organization, such as the Technical University of Crete, in order to automate a time consuming process. In the present case study, the process of printer cartridges procurement is chosen as an instance of a less automated and quite time consuming process, since it includes repetitive tasks that are currently being handled manually by the Department of Administrative Computer Infrastructure. Our case study includes the still challenging task of modeling a process with feedback (loop), an issue not covered in previous work.

In order to find out whether this kind of systems can indeed improve the performance of the institution, a pilot test was conducted, followed by a survey, with the purpose to examine whether such systems would be welcomed by the stakeholders. The results of the latter proved to be encouraging and denote the need of these systems, both from users' and administrators' side.



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| keywords: | Business Process Management Systems; Workflow Management Systems; Open Source Software; Case Study technology acceptance |

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| | multinational companies |

# Comparison of linear regression and neural network models to estimate the actual duration of Greek highway projects


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## Abstract


The aim of this study is to highlight and evaluate parameters that correlate with the actual project duration and compare linear regression with neural network models to predict a reliable final duration for highway construction projects based on data available at the bidding stage. The thirty seven highway projects that are examined, constructed in Greece, are similar in available data like the extent, the type of work packages and the significance. Considering each project's characteristics and the actual construction duration, correlation analysis is implemented, with the aid of SPSS. Correlation analysis identified the most significant project variables. These include archeological findings, type of terrain, land expropriation, the existence of bridge, tunnel and embankment. Furthermore, the WEKA application, through its attribute selection function, highlighted the most efficient subset of variables, both within the initial available attributes but also within the set of attributes identified through correlation analysis. These selected variables through correlation analysis and / or WEKA and appropriate combinations of these are used as input data for a linear regression models and neural network models. The corresponding models (linear regression and neural networks) are presented along with their performance. Finally, this paper presents the results of a relevant literature review on construction project duration, and the recorded corresponding findings, as well as the comparison of linear regression and neural network models to estimate the actual duration of Greek highway projects. Results' discussion and conclusions along with limitations and further research are appropriately analyzed.



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| keywords: | Highway Construction; Linear Regression; Neural Networks; Predicting Models; Project Actual Duration |

# Migrations and Quality of Life: Multi-Criteria Approach in Exploring the Causal Link


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## Abstract

Migration and its consequences represent an indispensable feature of the modern age, with the ever-increasing number of migrants globally. There is a great interest in the world about migration issues. Migration, with natural population growth, directly affects the economic, social, cultural, demographic developments, as well as the human capital of a particular region. The existing literature mostly accentuates the impact of economic factors, educational opportunities, job prospects, higher life satisfaction, and better health care as the main factors causing migration. However, few studies examine the link between various aspects of the overall quality of life and migratory movements. In most cases, potential migrants expect better job opportunities in the new environment, but also a better quality of life in every respect. Therefore, this paper aims to examine the link between the overall quality of life and migration. The quality of life assessment was conducted on a sample of 22 European countries, using 27 socioeconomic and environmental indicators grouped into 10 quality of life categories. Aggregation of data by groups was performed using SAW (Simple Additive Weighting) approach, while the determination of the overall quality of life was performed using PROMETHEE method (Preference Ranking Organization METHod for Enrichment of Evaluations). By performing a correlation analysis between the estimated quality of life and the crude net migration rate, it was observed that there was a significant, moderately strong positive correlation.

keywords: Quality of Life; Migrations; SAW; PROMETHEE

# Profit Optimization in a Two-Parking Lots System with Priority Clients using Resource Reservation Policies


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## Abstract

In this paper a two-parking lot system is considered which is near an airport terminal and can be accessed by clients who intend to travel. The clients arrive at the first parking lot (P1) where they can have access unless the parking lot is full. In this case, the clients are sent to the second parking lot (P2), where they can park if there are free parking places. Given that the parking lots are owned by the same company, the intention of the company is to increase the profit by providing service to as many clients as possible. However, the parking lots can be accessed by clients with different demands. Thus, we propose a model, based on a continuous time Markov chain (CTMC), in which clients are partitioned into different priority classes with different privileges and ticket prices. The highest priority classes can have access to all parking places, though lower priority classes can access fewer. To achieve this, parking places are reserved in both lots for higher priority classes. Consequently, a client can access P1 only if there are available places for his class, otherwise he is sent to P2 where he can park if there are available places for his class too. The aim is to provide service to as many clients as possible, increasing hence the total profit, and simultaneously minimize the probability of access denial (blocking probability) for all classes. To achieve this, a multi-objective optimization problem is formulated. The solution provides the optimal number of reserved parking places for each class that maximizes the total hourly profit and simultaneously minimizes classes' blocking probabilities. A numerical example for the proposed approach is presented and the results are compared to the case where no clients' classes are considered and thus no reservation policies are adopted.


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| keywords: | resource reservation; priority classes; Markov chain; blocking probabilities; multi-objective optimization |

# A Study of Digital Customer Journey Through Google Trends


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## Abstract

Digital Customer Journey is a process highly influenced by the offering value of commercial organizations that seek to enhance Customer Experience through Digital Transformation of their operations. The beginning of this journey usually starts with Google Search Engine utilization, the most dominant and popular search engine. Thus, key indicator for the most sought-after products and services are their respective searches online. Google Trends provides useful insights regarding online searches of specific keywords on the Google Search Engine and has been successfully utilized for research purposes in numerous scientific publications. Data that are publicly available are utilized to forecast the future demand by performing statistical analysis on the available data from previous years. Although, a rising route is expected for search terms concerning technological breakthroughs and the digital universe, what is truly important and noteworthy is the underlying hint and the information that are hidden behind raw data. It is the texture and the interpretation of this transmission that matters. Another key aspect of the current study is different locations and how they contribute to the total results when it comes to Google Trends. Geospatial data provide an added value on the Google Trends results something that Businesses evaluate before running a S.E.M. campaign with Google Ads. The philosophical question that this research tackles is when and where the number of Google Trends provide added value on the topic of Customer Journey and how biased conclusions can be avoided through this exploratory research.

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| keywords: | Digital Customer Journey; Customer Experience; Digital Transformation; Google Trends; Google Ads |

# Two metaheuristic approaches for the single allocation hub location and pricing problem


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## Abstract


Hub location problems (HLPs) represent a challenging and thriving research area in the location theory. In general, the goal of HLP is to find optimal locations of hubs and allocations of non-hub nodes to hubs with respect to some given objective. Hubs serve as consolidation and dissemination points when routing the flow between origin and destination (O-D) pairs.

This study considers the uncapacitated single allocation hub location and pricing problem (SAHLPP) that was recently proposed in the literature. The objective of SAHLPP is profit maximization by choosing the best hub and spoke topology and pricing structure for a price dependent demand. For every O-D pair, the corresponding demand is defined by a downward slopping function. Negative demands are not admissible. Also, there are no constraints concerning the node inclusion in the model. More precisely, the resulting optimal hub and spoke network does not have to provide services for all O-D pairs, which leads to a much larger search space compared to a classical single allocation hub location problem.

As SAHLPP is NP-hard optimization problem, the use of metaheuristic methods is a natural choice for solving real-size problem instances. Two metaheuristics, GRASP and VNS, are designed as solution approaches for SAHLPP. Local search procedure used in GRASP is based on a chained Lin-Kerninghan neighborhood and utilizes the 1/e-law as a stopping rule. Unwanted effects of randomization in GRASP are successfully suppressed by finite geometric distribution. Also, a novel way to allocate non-hub nodes to hubs is implemented. The proposed VNS for SAHLPP uses a pure greedy procedure to construct a solution with the number of hubs close to the optimal. Differently to the GRASP, the exploration and getting out from the local optima trap in VNS is done by the shaking procedure. The local search procedure used in VNS is based on the well-known Swap+Flip neighborhood.

Computational experiments with the proposed GRASP and VNS solution approaches were conducted on the set of hub instances from the literature. Both GRASP and VNS were successful in returning the high-quality solutions of SAHLPP, in very short running times. The obtained results indicate that GRASP and VNS represent promising solution methods for SAHLPP.



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| keywords: | GRASP; VNS; hub location; single allocation; pricing productivity of agricultural resources |

# The Impact of Artificial Intelligence and Operational Research Cooperation on the Finance and Business: A Literature Review


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## Abstract

Nowadays, due to the globalization of entrepreneurship and the rapid improvements in the information and communications technology, businesses need to use the right tools and procedures to be competitive. Artificial intelligence can play a key role in this. During the last decades, artificial intelligence and especially machine learning are becoming more and more established in the field of academic research and commercial utilization. According to recent studies the global GDP may increase by up to 14% by 2030 as a result of the development and adoption of artificial intelligence technology. However, enterprises have to reinvent their business model in order to integrate artificial intelligence technology into their daily procedures and implement an artificial intelligence strategy. Furthermore, there is a growing research in the interaction of machine learning and operational research. The main purpose of this paper is to highlight and analyze the impact of artificial intelligence in business and finance and its added value to operational research. For this reason, we provide a detailed review of the current scientific research regarding the applications of artificial intelligence and especial machine learning in the fields of business and finance from an operational research point of view.

keywords: artificial intelligence; machine learning; operational research; finance; business

# Evaluating the Appropriateness of Traffic Forecasting Methods for Use in a Freight Transportation System


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## Abstract

In recent decades, due to the intensification of the phenomenon of urbanization and overpopulation, more and more problems have arisen, regarding the traffic conditions, which are found daily, in every major urban network in the world. Traffic congestion has social, economic and environmental consequences, and public and private organizations have continuously tried to tackle and limit it. In this context, this paper proposes two algorithms: a conventional algorithm and a more alternative traffic forecasting algorithm. These algorithms were deemed suitable for urban freight transportation problems and will be utilized in an advanced vehicle routing and scheduling system that is currently under development. In order to achieve effective traffic forecasting, the scope, the time horizon, the forecasting step as well as the application challenges of forecasting algorithms need to be analyzed. Therefore, this paper includes a comparison and categorization of various traffic congestion forecasting algorithms. Concluding this analysis, the two most suitable algorithms are selected and proposed as options that would fit the implementation of the system. The first one utilizes data extracted from inductive loops and generates traffic forecasting through the ARIMA model and the second one combines data from GPS, Bluetooth and inductive loops, which it receives via a tiny traffic simulator (AIMSUN), and generates traffic forecasting through an extended Kalman filter.


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| keywords: | Traffic Forecasting; Urban Freight Transportation; Methods Categorization; ARIMA; Kalman Filter; Algorithms |

# Analytics of Portfolio Selection Based on Distributions of Max Entropy Frontier

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|---|---|
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## Abstract

Traditionally the Mean-Variance approach introduced by Markowitz (1952) is the classical portfolio selection theory. By the investors, the naïve equal weights portfolio or 1/N is very old, simple, and occasionally successful strategy. It is well known that equal weights derived mathematically as optimum solution of max entropy principle. In this paper the portfolio of N assets represented in an entropy chart with expected portfolio return as horizontal axis, the normalized entropy of portfolio weights in vertical axis as measure of portfolio diversification. The max entropy distribution of portfolio asset weights subject to expected return determines an efficient frontier of portfolio Return-Entropy (fig. 1). Each point of this max entropy curve represents a specific geometrical distribution of portfolio assets weights (fig. 2), the solution of a nonlinear constrained optimization problem. The relation with the efficient frontier of Markovitz Mean-Variance approach is discussed in detail. Further introduced the equivalent of Sharpe ratio to Return-Entropy efficient frontier, the Entropic Return Index. An Illustrative application to a 15 stocks portfolio of DAX index is used to examine the out of sample performance of Entropy-Return efficient frontier. The relation of proposed approach with naïve equal weights (1/N) or uniform portfolio discussed in the framework of Jaynes max entropy principle. Our real data application shows that entropic return index is possible to outperform both Mean-Variance and equal weights portfolios.

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| keywords: | Portfolio Selection; Max Entropy; Equal Weights Portfolio; Nonlinear Constrained Optimization; Max Entropy Geometrical Distribution; DAX index |

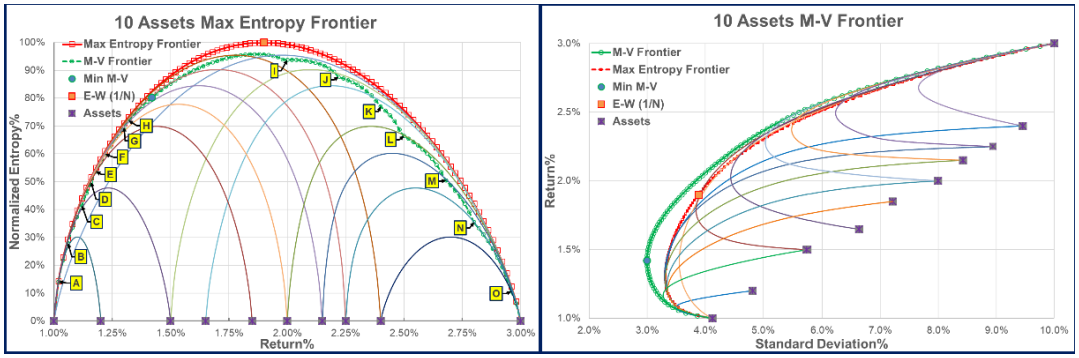


**Fig. 1**: The 10 Assets portfolio Entropy-Return Frontier (*left*) and Mean-Variance Frontier (*right*)

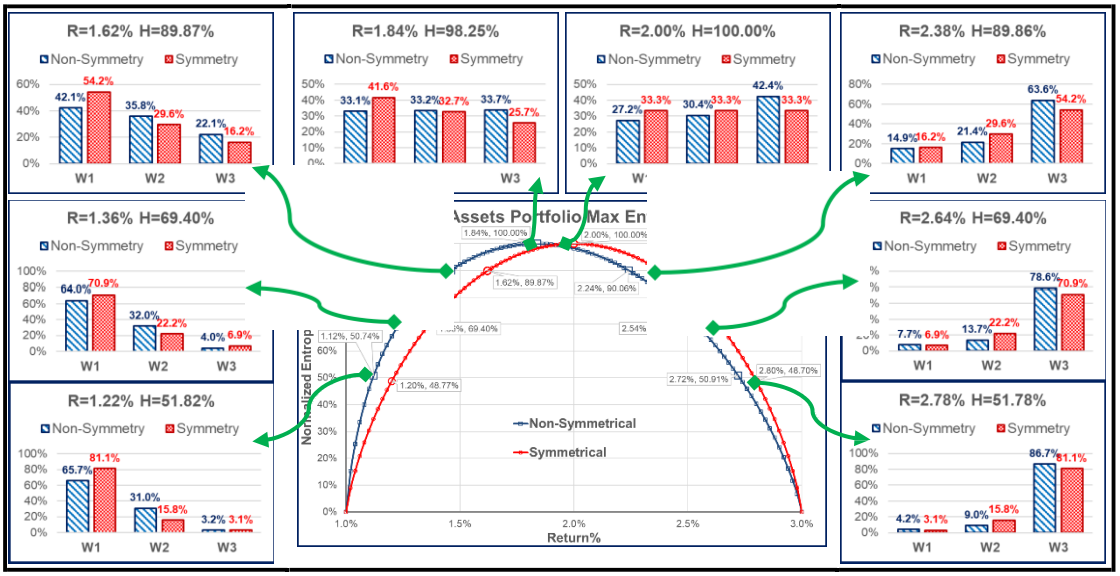


**Fig. 2**: The 3 Assets portfolio Weights Distribution, symmetrical and non-symmetrical case

# Growth hacking marketing strategies in the early stages of start-ups


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## Abstract

Marketing is a critical business operation for the growth, success, and sustainability of start-ups. However, young entrepreneurs with innovative ideas face significant challenges in trying to reach consumers. Particularly in the early stages of establishing and operating a start-up company, limited capital resources and difficulties accessing various sources of funding hinder the ability to design and develop integrated advertising campaigns. The lack of efficient marketing processes leads to high failure rates of start-up companies and entrepreneurs focus on finding smarter and low-cost strategies to boost their sales. It is clear, that start-ups need to develop some more sophisticated marketing techniques compared to established companies to become competitive and sustainable. Growth hacking is an experiment-driven technique to determine the most effective ways of growing a business. In order to reach out to a massive audience, entrepreneurs need to adopt different growth hacking techniques. Although some amongst these techniques have only been around for a few years, nonetheless, they prove to play a vital role in the growth of modern-day businesses. The process involves a mix of marketing, development, design, engineering, data, and analytics. This paper performs a literature review on entrepreneurial marketing techniques that implement new technologies and identifies smarter and inexpensive alternatives to traditional marketing that can boost start-up sales, such as content and viral marketing.


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| keywords: | Entrepreneurial marketing; Growth hacking; Digital marketing; Start-ups; Online promotion |

# Digital Marketing in Tourism: Insights from Greece


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## Abstract

Nowadays, digital marketing is an inseparable part of every successful business. The increasing role of digital channels such as websites and social media in consumer behavior is changing the way businesses are promoted and how they interact with leads and clients. Especially the marketing procedures in the tourism industry have undertaken significant changes since customers have constant access to online information and special travel offers. This paper examines digital marketing used by travel companies. It consists of three parts: (i) a literature review to identify the digital marketing techniques within the travel industry, (ii) a manually performed analysis regarding the digital presence of almost 3000 travel companies in Greece and more specifically in Halkidiki region, a summer destination in Northern Greece and (iii) a survey conducted to recognize the perceived benefits and the use of digital marketing by these companies. Results indicate that travel companies in Greece underuse digital marketing since they do not implement a holistic digital marketing strategy and that there is an increased need for digital marketing solutions in the travel sector.


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| keywords: | Digital marketing; Tourism industry; e-Tourism; Social media; Websites; Search engine optimization |

# Link Prediction in Signed Social Networks: The Case of Bitcoin Users


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## Abstract

During the last decade, social networks appear in many aspects of modern life. By their nature, these networks are dynamic objects and, thus, questions have been emerged regarding their evolvement during time. The availability of large datasets encoding network information along with the novel machine learning algorithms/solutions have made possible the extensive study of social network properties and structural features. In our work, we study the well-studied link prediction problem which seeks to accurately predict future possible links on the network or missing links due to incomplete data. The most common modelling approach is to represent these networks as graphs, where the nodes represent entities while the edges/links represent the association between entities. We focus on weighted signed social networks and try to predict new edges in a real-world dataset. Specifically, a Bitcoin network is being employed where different users rate the level of trust (on a scale ranging from -10 to 10, excluding 0) they have in other users. Three different frameworks for representation learning on large graphs have been used; namely, Node2Vec, CDTNE and GraphSage. Following, standard steps involved in supervised learning, the performance of the selected learning functions have been measured using well-known metrics (e.g. accuracy, precision, AUC-score) for each implementation strategy employed in our analysis. All three employed techniques are compared under the aforementioned Bitcoin-related network and the results provide distinct useful insights on the network's future formation. Additionally, the same methodologies are applied to a well-known dataset citation network of scientific publications (known as CORA dataset) in order to validate further the conclusions of the preceding analysis. Finally, we discuss how the different methodologies regarding network embeddings and link prediction frameworks can be combined effectively to achieve better results regarding the link prediction problem.

keywords: signed networks; link prediction; Node2Vec; GraphSAGE; CDTNE

# An inclusive representation approach to assess the redesign capacity of BPMN models


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## Abstract

Business Process Redesign (BPR) encompasses various techniques for modifying the process design, depending on the feedback of the process run-time, and/or the performance attributes. Although a detailed analysis of a business process typically sparks assorted ideas and perspectives for redesign, it is usually contacted in a non-systematic way, and is predominantly considered a creative activity. So far, only a few redesign approaches in literature investigate how the improvement procedure can be methodologically supported to reduce the uncertainty from the AS-IS to the TO-BE process. What is also overlooked is the evaluation of the BPR impact prior to its implementation, since the majority of approaches deal with BPR at runtime. The proposed approach introduces a representation method that incorporates a visual and quantitative perspective, and is a combination of the established BPMN 2.0 standard and an adapted graph-based structure, initially designed for agent concepts. It encompasses an inclusive set of BPMN elements and a list of ordering constraints from declarative business process modelling, to capture the execution logic of each model. The application of the representation method to a typical business process model showcases: (a) the a priori evaluation of input models in terms of redesign capacity, and (b) the fact that it is amenable to cost-based optimization techniques. Given a business process model in the proposed representation, a practitioner is assisted towards redesign decision making at an earlier-than-runtime stage, to avoid unnecessary risk.

keywords: Business Process Redesign; business processes; evaluation; representation; modeling

# A systematic investigation of the main variables of the Business Process Optimisation problem


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## Abstract

Business process optimisation (BPO) is one of the key research areas that provide a formal perspective of the concept of business processes and signifies the automated improvement of BPs using pre–specified measures of performance (objectives). The importance of BPO lies in the ability to evaluate and compare alternative BP designs based on quantitative evaluation criteria, towards the selection of optimal solutions. The approach, presented in this paper, builds upon an evolutionary multi-objective business process optimization framework (bpoF), that utilizes BP representation through the Process Composition Algorithm (PCA) and EMOAs to generate alternative optimized designs. This paper revisits the bpoF by conducting an extended and systematic investigation of the BPO problem variables, through the employment of the statistical approach Design of Experiments (DoE). By employing a series of scalable tests, the variables of bpoF, were examined to determine their limits and the application of DoE conducted to the analysis and interpretation of the results. The principal contribution of this approach is the discovery of the variables that have a significant influence on the results, the magnitude of these influences, as well as the involvement proportion of these variables on the result formation.

keywords: Business Process Optimisation; business processes; Design of Experiments

# Towards a comprehensive design of BPM lifecycle: The notion of core cycle-steps (CSS)


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## Abstract

There is a plethora of approaches towards designing a BPM lifecycle and the established attempts have known issues and limitations; namely the multitude of included cycle steps and their irresolute positioning in the lifecycle. Most of the BPM lifecycles consist of a set of discrete cycle steps (e.g. Identification, Modeling, Analysis, etc.). These steps represent discrete BPM phases that are identified and placed in a specific order (forming a "lifecycle") so that they can effectively cater an organization's business processes. However, this notion has inherent issues that have resulted in a significant variety of BPM lifecycles with combinations of cycle steps. The authors examined and located the most popular BPM lifecycles in literature, narrowing for studies on BPM lifecycles from 2000 until 2017, and located twelve lifecycles that are highly cited. This paper introduces the notion of core cycle steps (CCS) of the selected BPM lifecycles. CCS are cycle steps that describe a single BPM phase following a standardized naming convention. The CCS emerged from the aggregate processing of all the cycle steps of the examined BPM lifecycles. The aim of producing the CCS is to better study and evaluate: (a) their importance, i.e. why they are selected for inclusion in a BPM lifecycle), (b) their placement, i.e. their specific positioning in each lifecycle, and, (c) their associations, i.e. their relevance to their precedent and antecedent steps across the various lifecycles. By examining these traits, a comprehensive BPM lifecycle is put forward with justification of the cycle steps that are included and their positioning in the lifecycle.


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| keywords: | Business Process Management; business processes; BPM lifecycle model; core cycle-steps (CSS)physicochemical properties |

# Gamified mobile apps in Health and Fitness


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## Abstract


The concept of "Gamification" has become more and more popular. It is an innovative business model that focuses on applying game mechanics to non-game contexts in order to engage audiences and inject a little fun into daily activities; besides generating motivational, social, emotional and cognitive benefits. Developing positive social relationships and promoting a feeling of integration are the key social benefits noted for gamification. Typically, the various game mechanics potentially involved in gamification are regarded as an anchor point for players to ensure a flow of cognitive skills, such as achieving a state of concentration, developing problem-solving skills and acquire a sense of goal- orientation. Additionally, users bring out emotional skills, such as auto-satisfaction and self-esteem when they achieve a target. Gamification mechanics also motivate individuals to be more competitive in order to fulfill the challenges provided. The purpose of this paper is to explore the ability of gamification to provide incentives and influence behaviors related to maintaining and protecting health based on mobile apps. A literature review of gamification systems in mobile health apps and particularly in fitness is presented. As evidenced by the literature review, gamification can help patients increase physical activity, improve eating habits and regulate body weight. Primary research shows that users are increasingly committed to gaming electronic health systems. In particular, the review of mobile gamified applications in the field of fitness revealed 31 applications with a good response from users, a large number of downloads and good ratings. Although gamification is not widely used in m-health, the results of both the literature review and the mobile apps review are encouraging for the future. The initial results show a significant use of gamification in health and fitness applications, which requires in-depth study and evaluation of the gamification potential for a change in health behavior.



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| keywords: | Gamification; gamification in m-health; gamified mobile apps; fitness apps |

# Multi Criteria Evolutionary Algorithm for Research Team Formation


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## Abstract

Considering that research teams are the structural social unit of science, research team formation is one of the key operations in collaborative learning and research. Due to the NP-hard nature of the problem we introduce a new mechanism based on an evolutionary and decision-making algorithm approach for attaining the optimal or nearly optimal team for a specific project, satisfying the constraints of the project. One of the main features of the proposed method is that it allows for the consideration of as many constraints as may be required, by helping to find the best solution through the multiple-choice process of limited alternatives, translating the team problem into one of decision-making optimization problem. In addition, a satisfactory solution is always returned. In order to verify our approach, an experiment was designed and tested with two case studies forming teams from a pool of 3000 virtual researchers, considering specific constraints. Results of the experiment allowed for the validation, not only from the computational point of view by measuring the algorithmic performance, but also to detect the issues to be considered for the improvement of the algorithm.

keywords: Multi-Criteria; Evolutionary Algorithms; PROMETHEE; Team Forming; MCDA

# Multicriteria evaluation with TOPSIS method for digital promotion in local alternative tourism sector


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## Abstract

Although mass tourism contributes to economic growth and job creation, it also demonstrates side effects, such as deterioration of touristic areas due to imitation of imported cultural standards, transformation of areas of natural beauty into urban centers without local cultural character and environmental pollution. Mass tourism criticism has led to the development of alternative tourism, which is characterized by mild small-scale tourism and includes, among others, eco and cultural tourism, gastronomic/wine tourism and agritourism. An important factor in the promotion of alternative tourism is the development of contemporary ICT services. Finding a potential alternative tourist destination, generally unknown to the public, is now easier through online and social media services that spread personal travel experiences and provide information through addresses, photos, and videos of travel destinations. The Prefecture of Kavala gathers a wide range of forms of alternative tourism including eco-tourism in the National Park of Nestos Delta, sites of significant historical and archaeological importance, health and spa services, various sites of religious tourism and offers a wide range of agricultural products and a variety of forms of alternative coastal and marine tourism on the coasts of Kavala and Thassos. This paper aims to study and evaluate the enterprises that promote alternative tourism in this region qualitatively and quantitatively according to their digital characteristics used as criteria, based on the multicriteria method of TOPSIS. Finally, the optimum enterprises are identified and described to be used as a model with enhanced digital promotion. The findings of this study reveal the progress, the development and the perspectives of the local alternative tourism sector in the current competitive era, as well as the digital promotion rate in the sector.


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| keywords: | alternative tourism; multicriteria evaluation; TOPSIS method; digital promotion; prefecture of Kavala |

# Conventional and Electric Vehicles for Freight Distribution: A Case Study in Greece


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## Abstract

City logistics and last-mile distribution have gained the interest of practitioners and logistics companies, as well as of consumers and inhabitants. In the case of companies, the objective is to minimize distribution costs and improve the quality of services provided. On the other hand, consumers require fast deliveries and accuracy in time restrictions. Moreover, society and governments are interested in the minimization of greenhouse gas emissions, which greatly affect cities. Addressing effectively the distribution of products in urban areas presupposes the use of advanced algorithms solving optimally the routing of vehicles and scheduling of deliveries, as well as the use of new technology vehicles with minimal fuel consumption and gas emissions. On this premise, the paper proposes a genetic algorithm that addresses the Vehicle Routing Problem with Time Windows and Simultaneous Pickups and Deliveries, while considering the type, characteristics and specifications of the vehicles used. This algorithm is also used for the calculation of the effect of petrol, diesel, and electric vehicles in the logistics sector, and the environment. Therefore, the algorithm is tested and evaluated in real-life distribution cases addressed by a logistics company in Greece. The results obtained from the algorithm are compared and evaluated, while proposals for improving the efficiency of deliveries, as well as for reducing greenhouse gas emissions and costs are made.


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| keywords: | Vehicle Routing Problem; Electric Vehicles; Time Windows; Conventional Vehicles; Genetic Algorithm; Greenhouse Gas Emissions; Delivery Cost; Case Study |

# Verification of Academic Qualifications through Ethereum Blockchain: An Introduction to VerDe


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## Abstract

Blockchain technology significantly contributes to the verification process of academic qualifications since, by design, is resistant to modification of the data it holds. Blockchain is an open, distributed ledger that can record transactions of a community efficiently and in a verifiable and permanent way. In the context of academic qualifications, it can be assumed that: (a) an academic qualification is a public transaction between an Institution and an individual, (b) there are stakeholders that need to access these transactions, and, (c) each transaction cannot be modified once executed. These assumptions in conjunction with the decentralized nature of blockchain and the nonnecessity of a trusted authority make blockchain an attractive solution. This paper presents the conceptual design of VerDe, an application that aims to provide verification for academic qualifications utilising the Ethereum Blockchain. Similar applications have been proposed in literature but appear to have high implementation and maintenance cost. VerDe is innovative in utilising cryptocurrencies, namely the ERC20 token, for the verification of academic qualifications. The advantages of the proposed approach are: (i) integrity of stored data, (ii) decentralized data storage, (iii) instantaneous verification, (iv) low development and maintenance cost, and, (v) user-friendly interface. The paper discusses the potential benefits of VerDe through two use cases: for fraud detection and for study mobility.

keywords: Ethereum Blockchain; ERC20 token; Smart contracts; Verification; Fraud detection

# A Questionnaire Based on the SERVQUAL Instrument to Reduce the Digital Divide of Business Processes


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## Abstract


The digital divide is affecting businesses more and more, and most importantly, it has a direct impact on business processes. Individual factors that create the digital divide, such as human resource skills, organizational behavior issues, integration of modern technology, as well as issues related to Change Management, have made businesses vulnerable. Although the literature on the digital divide is constantly being enriched, it is nevertheless common to focus on the analysis of the Digital Divide in terms of the company's behavior with society itself and not with business processes. After all, in the past, important trends, such as the Business Processes Automation and the Business Processes Reengineering have highlighted the need for business compliance in the modern business environment. It is now becoming increasingly clear that the trend of Digital Transformation is bringing businesses to a new great challenge related to the integration of the technology and skills of human resources. Digital inequalities that are created are significant and mainly focus on the fact that the company loses ground in terms of competitiveness and productivity. The inequalities created in low-tech businesses are considerable and are mainly affected by the low competitiveness they have, compared to those that have made greater use of technology.

The current work attempts to present a questionnaire based on the SERVQUAL instrument in order to measure the perceptions and expectations of employees from the introduction of elements that reduce the digital divide in the companies that are employed. These elements will be based on the skills of employees, issues of organizational behavior of companies, the integration of modern technology, as well as on issues related to Change Management. Finally, the questionnaire can be applied dynamically in order to determine whether the Human Resources Dept has realized the efforts to reduce the digital divide made by businesses.



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| keywords: | Digital Divide; Digital Inequalities; Business Process Reengineering; Digital Transformation; SERVQUAL Instrument |

# Customers' satisfaction and Market Share: An Approach of the Greek Mobile Sector


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## Abstract

Over the past decades the telecommunications industry is proven one of the most dynamic and competitive industrial sector around the world. Mobile communications have become an integral part of the industrial sector. In Greece the telecommunications industry is considered as one of the most importantly developed sectors of the economy, with high added-value services. The contribution of the industry's turnover to Greek Gross Domestic Product (GDP) was 2.6% in 2018. Market share and customer satisfaction are commonly used as key performance indicators to evaluate marketing performance. Market share and customer satisfaction are also used as key performance indicators in alignment with the overall financial management of an enterprise. This paper aims to shed light on the relationship between market share and customer satisfaction in the Greek mobile sector. Data were collected through questionnaires, which were structured in order to better understand customers' views on the service offered as well as the satisfaction levels on particular aspects of the service offered. Customers' satisfaction was measured using the MUSA method, a multi-criteria analysis based on the principles of qualitative regression. The relationship between customers' satisfaction and market share results has been analysed using correlation coefficients and regression models. The research findings unveiled a positive correlation between customers' satisfaction and market share.

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| keywords: | Customer Satisfaction; Market Share; Mobile Industry; Multicriteria Analysis; MUSA Methodology |

# The Effects of Customers' Satisfaction on Business Profitability in Greece's Banking Sector. An Empirical Study


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## Abstract

Over the last few decades, the linkage between customers' satisfaction and business profitability is proven a very important factor in modern business organizations. According to many researchers' customers' satisfaction is strongly correlated to business profitability. Besides, several research efforts studied this linkage in order to determine the extend of effecting customers' satisfaction on business profitability. Thus, customers' satisfaction has gained vivid interest of scholars worldwide. Business profitability can be determined by customers' loyalty and an increasing market share. Besides, the banking sector at both international and national levels is currently appreciated as one of the most dynamic and competitive industries. The aim of this research is to investigate the relationship between business profitability and customers' satisfaction in the Greek banking sector. The analysis of the customers' satisfaction was based on the multicriteria MUSA (Multicriteria Satisfaction Analysis) method. MUSA is an ordinal regression model which is based on the principles of multicriteria decision analysis. MUSA method is part of the wider category of aggregation – disaggregation approach, being based on the principles of qualitative analysis regression. Data were collected through a web site questionnaire that was been delivered in order to better understand the customers' views on the service overall as well as their satisfaction levels on particular aspects of the service. The relationship between business profitability and customer satisfaction results has been analysed using correlation coefficients and regression models. The research findings unveiled a positive correlation between customers' satisfaction and bank profitability.

keywords: Customer satisfaction; Banking Sector; Profitability; Multicriteria Analysis; MUSA

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| | Methodology |

# An Examination of the Relationships between Customers' Satisfaction and Business Performance: The Case of Greek Mobile Industry


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## Abstract

Over the last two decades mobile communications industry is considered as one of most important and rapidly growing sectors of the economy around the world. In Greece the mobile communications sector is considered as one of the most importantly developed sectors of the economy. At the end of 2018, the Industry turnover reached at 4.8 billion euros, while its contribution to Greece's Gross Domestic Product (GDP) was 2.6%, showing a decreasing trend comparing to 2017. Customers' satisfaction is one of the key components for the industrial development. Many researchers argue that there is a strong, positive relationship between customer satisfaction and business performance. The aim of this study is to examine the relationship between customers' satisfaction from the three larger mobile companies participated in Greece (Cosmote, Vodafone and Wind) and the business performance of these companies. The reported customers'' satisfaction was analyzed with the Multicriteria Satisfaction Analysis (MUSA) method, which is considered as an aggregation–disaggregation approach developed on the qualitative analysis regression. The implementation of this survey was structured through the development of a web site questionnaire, addressing customers' satisfaction of the aforementioned three mobile telecommunications companies. Comparable analysis of the relationship between business performance and customers' satisfaction, it was deployed by using regression models and correlation coefficients. The research findings unveiled that customers' satisfaction and business performance are positively related.


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| keywords: | Customer Satisfaction; Business Performance; Mobile Industry; Multicriteria Analysis; MUSA Methodology |

# Attitudes and Behavior of Greek Teachers Towards the Implementation of Intercultural Practices


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## Abstract

Globalisation, technology advancement, the influx of people and the freer movement of people have caused considerable social stress and unrest. Specifically, such changes are key determinants to the foremost significant issues of inclusion, tolerance to the others and respect to the different. In this context, education is a vital pedagogical tool to build up the attitudes and the behaviour of the educates. However, such personal development of personalities has undergone fundamental changes as well, which have been certainly framed in intercultural education. Recently intercultural education has gained great emphasis, enactment and activity due to a number of reasons: advancements in digital technology, freer and increased mobility among people worldwide, as well as migration to European countries, being all critical viewpoints of conceptualizing globalization. The research outcomes signified those practices' related to interculturalism and the necessity of applying them among educational communities. The surveyed educators' denoted the need of changes and/or taught adaptations regarding the existing curricula, while significant statistical correlations between demographic data and three interculturality factors were also addressed.


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| keywords: | Intercultural Education; Intercultural Practices; Intercultural Competence; Correlation Coefficients |

# Programmatic Marketing: The Demand Side Platform in the Greek Market


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## Abstract


Technological changes produced by the digital convergence are driving a paradigm shift in advertising and marketing resulting in the emergence of a new market.Programmatic Advertising plays an important role in Digital Marketing, as it manages to reflect the rapid changes in the Advertising Market, which happen due to the use of modern information technologies.Therefore, programmatic marketing is the purchasing of digital advertising space through real-time bidding, a technology that automates digital media buying. Programmatic buying and selling of digital advertising inventory, including real-time bidding (RTB) has been growing over the past couple of years and has the potential to transform how we buy and sell ad inventory.

In specific, a Demand Side Platform (DSP) is an automated buying platform, where advertisers and agencies go to purchase digital ad inventory, including banner ads on websites,native ads,mobile ads and the mobile weband video. DSPs allow advertisers and agencies to buy across a lot of sites at the same time, offering them several audience targeting capabilities, a real-time view of their campaign performance, optimizations toward a goal, and flexible budget shifting. DSPs are a part of programmatic advertising, which refers to buying digital ad space automatically.

Programmatic advertising uses data to decide which digital advertising spaces to buy and how much to pay for them. The Programmatic Marketing promises to the advertisers the achievement of the 3-Rs, or in other words the ability to send the Right message, to the Right consumer, at the Right moment. However, these are not Programmatic Marketing only functions. Using the unprecedented possibilities offered by the Artificial Intelligence and the Machine Learning, it attempts to understand the context in which human lives evolve and analyze the complexity of the real world.

This new advertising ecosystem includes entities with distinct roles that interact with each other, digital platforms which make ad inventory automated buying possible, and different transaction Models.

The present paperfocuses on the demand side platform based on literature review and on a primary qualitative research. The chosen tool for the collection of the data was the in-depth interview. This specific tool allowed the recording and the analysis of the views, opinions, experiences and feelings of the interviewed participants about the Programmatic Marketing. Furthermore, an effort was made in order to depict the current presence of Programmatic Advertising in the Greek Market and to find out if the current situation complies with the theory or not.

This research led us to the following conclusions. Firstly, a business entity can gain a better understanding of the consumers and their needs, personalize the ad message, target in a far more effective way and enhance its reputation and profits, by adopting Programmatic Marketing methods. Secondly, it was found that the size of the Greek Market concerning Programmatic Marketing is relatively limited compared to the other European Markets. More specifically, only 15-20% of the advertising budget is invested on Programmatic Marketing in Greece. Thirdly, the reasons behind the non-adoption of Programmatic Marketing in Greece concern the inadequate informing of business entities, the poor promotion about this form of Marketing and the lack of training among the executives. Furthermore, the results of the research have demonstrated that the communication channels preferred by the Greek Market are Mobile Web, Display and Video and the most commonly chosen transaction models are Preferred Deals, RTB and Programmatic Guaranteed. Moreover, the most significant issues regarding Programmatic Marketing are the low level of transparency in transactions and their additional fees, the Ad-tech fraud, the insufficient management over data and the Brand Safety. Finally, the research also concluded on the future challenges and restrictions of Programmatic Marketing, revealing that specific aspects need either effective confrontation or improvement. Indicatively, the most crucial ones are control over data, compliance with the GDPR regulation, saturation and insecurity among the consumers, extensive usage of Ad blocking software, quest of suitable trained staff, Brand Safety and high level of prices.

| keywords: | programmatic marketing; programmatic advertising; DSP platform; real-time bidding (RTB); consumer data analysis; ad inventory |
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# Business Process Management Simulation in Academic Libraries: A Case Study


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## Abstract

While several studies have shown the usefulness of computer simulations, real case applications are still lacking, especially in the field of academic libraries. At the same time libraries are increasingly required to provide better services at lower cost, strengthen their customer focus and monitor control processes. Libraries are facing to lack of resources, long wait times, and financial loss. Libraries' staff often complains dissatisfaction in a high stress work environment. In this paper a case study was implemented presenting the business process modeling of the circulation department at the library of the University of Macedonia. The circulation department is the service point where books and other materials are checked in and out of the library. Following interviews with the library's staff, and through an accurate quantitative analysis, the current situation as it is (As-Is model) was analyzed. Then, simulation using the Business Process Management (BPM) framework was used in order to see how entities flow and to detect and understand inefficiencies, and risks. Finally, the analysis of the As-Is model in different activities may suggest changes in the library's business model and the effects can be studied in order to reduce time, cost and resources.



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| keywords: | Business Process Management; Business Process Modeling; Process Analysis; Process Efficiency; Academic library |

# A meta-frontier global Malmquist approach for hospitals productivity and quality measurement


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## Abstract

The objective of this study is to examine the productivity growth and quality changes of 110 Greek public hospitals during the period 2009–2013. Through the nonparametric estimation of a quality adjusted metafrontier Malmquist index we account he heterogeneity of hospitals according to the hierarchical structure of the healthcare system (primary, secondary and tertiary care) to examine the trends of efficiency change, innovation change, and technical leadership change. To understand the effect of the economic crisis in healthcare we further explore whether there is a trade-off between productivity and quality in the hospital production. The results show that Greek hospitals have experienced a productivity growth and a negative evolution in quality during the study period. This possible trade-off is mainly found in the large and medium size hospitals.

keywords: Data envelopment analysis (DEA); Metafrontier; Malmquist index; productivity, quality

# Decision Support Tool for Ranking Robotic Process Automation Candidate projects


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## Abstract


Our work in this paper is firstly about discovering the criteria required for a successful Robotic Process Automation (RPA) project proposal assessment aiming to raise the chances for a successful implementation. Robotic Process Automation is a modern field of Information Technology allowing organizations to automate mundane and mechanically repeated human tasks. Secondly, this research provides a tool to assess potential processes for automation effectively. The literature reviewed for this study is previous research of RPA as well as successful case studies. The theoretical part of the study was completed by interviewing six experts in the field. The result of this work is the creation of a tool that assists organisations with the selection, assessment, and prioritisation of processes for automation. After discovering the criteria we asked two experts to prioritize sample projects (many of them real-life proposals) and used the UTA* method for extracting the weights in order to develop a decision support tool.

The research suggests that it is crucial to conduct a process assessment before development since many RPA projects fail due to poor choice of processes. The results suggest that there are ten main criteria when evaluating a process for RPA and three criteria, which, in combination with some of the main criteria, have an impact on the prioritisation. The Process Assessment Model is a simple but effective tool for organisations to quickly remove processes that are not ideal for automation with RPA. The Process Assessment Formula is a tool which calculates the complexity of the process as well as the value it will provide, if automated, to decide whether the process should be automated and categorise it in a priority

table. Our tool can assist organisations in deciding effectively which processes can be automated, and which are suitable for automation.

keywords: Multiple-Criteria Decision Analysis; Robotic Process Automation; Decision Support Systems

# Augmented Analytics: A new era for Human Resource Management


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## Abstract


In recent years, Human Resources (HR) departments have overstepped their usual role and become an essential part for the organizations that strive to accelerate their performance and value in the market. In the same line, People Analytics (PA) has transformed the way HR department works, while organizations more than ever need data-driven decisions. By applying statistics and machine learning techniques, PA provides insights that allow them to make faster and better strategic decisions, improve employee training, reduce employee turnover, and make acquiring talent more effective.

Further, quite recently, Augmented Analytics (AA) has introduced automation to the HR department's operations, provided considerable improvements over the analytics cycle, changed dramatically business intelligence, and supported automated data-driven decisions. As data increasing and became big data, Augmented Analytics becomes more valuable by involving artificial intelligence (AI), machine learning, and natural language processing methods to provide managers a more user-friendly approach to analyze HR data. Augmented Analytics is capable of supporting decisions in HR management as it can considerably improve hiring efficiency, control voluntary attrition, and improve employee engagement.

This paper examines the steps of a proposed Augmented Analytics framework that can be applied in HR management. Firstly, it presents and discusses the existing literature in AA and reviews the analytics cycle of applications in HR. Secondly, an attempt is made to propose a new theoretical framework for examining different scenarios and display the advantages and disadvantages of AA applications throughout the analytics cycle.

The specific proposed framework will eventually be able to highlight several important implications of the use of AA from modern organizations, and indicates further research potentials, since AA is increasingly becoming a vital factor in business growth and turn into Decision Intelligence.



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| keywords: | Human Resources Management; Augmented analytics; HR Analytics; Decision Intelligence; People Analytics; Business intelligence |

# Portfolio productivity performance assessment using a Sequential Malmquist–Luenberger index


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## Abstract


Beside the traditional portfolio performance indices, a growing body of studies has already used frontier methods as a tool for benchmarking comparisons in investment analysis. Based on the assumption that return is desirable while risk is to be avoided these studies have applied non-parametric efficiency measurement techniques, most prominently data envelopment analysis (DEA). Rather than focusing on standard DEA performance measures, some studies adopt the directional distance function. Unlike the traditional DEA models that optimize solely either in a return augmentation or in a risk contraction orientation, the directional distance function simultaneously optimizes in both orientations as much as it is technologically feasible.

Most studies to measure portfolio productivity changes are using the Malmquist index (MI). However, MI has the possibility of producing biased productivity measures because it might not consider the features of technology appropriately. This stands because it is not uncommon to observe technical regress, while in general the technology in financial markets at least remains unchanged. Malmquist–Luenberger (ML) index suggests an alternative measure of portfolio productivity measurement. However, the ML productivity index presents the same limitation to MI, ignoring past technology in the evaluation.

To overcome the drawback of ML model on portfolio productivity gauging, this study employs a Sequential Malmquist- Luenberger productivity index which merges the concept of the sequential reference production sets and the concept of the directional distance function.

Based on a balanced panel dataset of Greek Equity Mutual Funds over the period 2003-2014, where the Greek market is characterized by major fluctuations, this study monitors the static portfolio efficiency and the dynamic portfolio productivity change of Greek mutual fund industry. The portfolio performance over time is decomposed into the contribution of efficiency change and technological change. Furthermore, it lets investors to measure both the degree that a portfolio improves or worsens its efficiency in return and risk and the effect of the innovation in financial markets on the portfolio productivity.

| keywords: | Sequential Malmquist-Luenberger; DEA; Directional Distance Function; Productivity index; Efficient portfolios |
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# Determination of the weights of compliance criteria for the selection of bridge construction method


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## Abstract


The subject of this study constitutes a part of a more comprehensive research, which aims to develop a methodology for selecting the most appropriate, per case, among the five current bridge construction methods (Cast-in-place, Precast I-Girder, Incremental Launching, Advanced Shoring method, Balanced Cantilever), in cases of concrete road bridge projects. In the present study, this choice of construction method isn't based only on the economic criterion, which is used to date almost exclusively for this purpose, but it is made on the basis of seven compliance criteria, namely: safety, economy, durability, construction speed, serviceability, aesthetics and environmental harmonization. The management of this large number of criteria becomes possible, in the context of the research, with the help of a valid decision-making tool, such as Multicriteria Analysis, and in particular the AHP multicriteria method. The application of Multicriteria Analysis initially requires the determination of the weights of compliance criteria, which is the main issue of the present paper. However, since this type of research does not provide the possibility of experimental support for its assumptions, it was decided to resort to the opinion of a large number of experts on bridges. Their participation was made through the completion of a suitable Questionnaire. The experts who are participating in the research, come from academia and the construction industry, and are among the most trained engineers in the field of Bridges in Greece. It is noteworthy that in the study, the concrete road bridges are divided into three categories, depending on their importance (bridges of Highways, of National Roads and of Provincial Roads). Therefore, different weights of compliance criteria are calculated for each one of these three categories. The results of the research, which are based on the answers of experts, are presented in detail, through tables and diagrams.



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| keywords: | Multicriteria analysis; Compliance criteria; Bridge construction method; Criteria weights; Questionnaire; Experts |

# Project Evaluation Criteria Prioritization by Using a Type-2 Fuzzy MCDM Model


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## Abstract

Projects have become one of the most important routes to generating business values; so, their success is increasingly becoming an imperative for companies, especially the issue of their evaluation. In that context, it is critical to establish a system of multiple criteria for the evaluation project relevance to an organization's objectives, the probability of its success, its potential performance, the strategic leverage potential or its compliance with available resources. The criteria prioritization, aimed at reflecting organization`s preferences with regard to their relative importance is imposed as the major part of evaluation process. However, the key issues accompanying criteria prioritization are: the lot of uncertainties, the impossibility of expressing preferences relations by means of crisp measures, the vagueness of human perception and a lack of quantitative measures. The model proposed in this paper is aimed at responding to those challenges. This model is based on the extending of the Analytic Hierarchy Process for handling fuzzy problems of prioritizing project evaluation criteria within the context of interval type-2 fuzzy sets. Since type-2 fuzzy sets are defined by the intervalvalued membership function which is fuzzy itself, it is able to model different sources of uncertainties and vagueness in the prioritization process, and also to handle the unsuitability issues of type-1 fuzzy sets. The proposed methodology could be applied to project selection during the initiation stage or as a part of the evaluation procedure for ongoing projects throughout the project lifecycle.

keywords: project evaluation criteria; MCDM; AHP; interval type-2 fuzzy sets

# Tourists' satisfaction by local foods' consumption in Greece: a MUSA application


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## Abstract

This research aims at investigating tourists' satisfaction by local foods consumption in Greece. Through Multicriteria Satisfaction Analysis (MUSA method) the link, between tourists' satisfaction by local foods consumption and tourists' attitudes towards local foods, is investigated. MUSA, a multicriteria decision analysis method, is used as an ordinal regression-based preference disaggregation technique which measures and analyzes customers' satisfaction. MUSA is utilized for the estimation of the contribution (importance) of tourists' attitudes towards local foods to the satisfaction by local foods' consumption. The survey took place at July to October 2018 in Thessaloniki where 311 properly answered questionnaires were collected by tourists at the Airport Macedonia. The criteria used were taste, health, safety, nice smell, authenticity, quality, inexpensiveness, nice appearance, nice package, connection to Greek culture and enhancement to Greek economy. The criterion obtaining the strongest weights is taste, followed by safety, nice smell, authenticity, nice appearance and connection to Greek culture that obtain the same weight, while the criterion with the weakest effect is inexpensiveness. Tourists are not strongly demanding regarding the selected criteria as all demanding indices are negative. The attributes with the strongest performance are taste, nice smell, authenticity, safety and connection to Greek culture, while the overall average performance of satisfaction by Greek foods' consumption obtains a high score as well. Results suggest that tourists' satisfaction, regarding local foods, is mostly affected by sensory traits, followed by authenticity, cultural traits, and safety.

keywords: tourists; tourism food consumption; local foods; Greek foods; MUSA; multi-criteria analysis

# Criteria for honey consumption in Greece: a MUSA application


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## Abstract

The aim of this research is to investigate honey consumer preferences in Greece. The MUSA method (Multicriteria Satisfaction Analysis) is utilized to link the frequency of honey consumption with consumer attitudes towards honey. MUSA is an ordinal regression-based preference disaggregation method for measuring and analyzing customers' satisfaction in the area of multicriteria decision analysis. MUSA is used to estimate the contribution (importance) of consumers' attitudes towards honey to the frequency of honey's consumption. The survey took place at March 2019 in Thessaloniki where 471 properly answered questionnaires were collected. The criteria used were taste, safety, nutrition, health, environmental friendliness, trust towards producers, enhancement of local economy, environmental helpfulness, connection to Greek tradition, connection to Mediterranean Diet and connection to a nutritious diet. Criteria weights of the analysis showed that environmental helpfulness, nutrition and taste are the attitudes with the strongest effect on honey consumption, while the criterion with the weakest effect is trust towards producers. Demanding indices of all criteria are negative, thus consumers are not strongly demanding regarding the selected variables. The attributes with the strongest performance are nutrition, health and taste while the overall average performance of honey consumption frequency obtains a high score as well. Results suggest that Greek consumers are strongly affected by environmental awareness and health issues when purchasing honey while sensory attributes (taste) are also important.

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| keywords: | honey consumption; Greek consumers; consumer behavior; MUSA; multi-criteria analysis; operational research |

# A PROMETHEE multi-criteria analysis for the EU countries using EPI data


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## Abstract

The Environmental Performance Index (EPI) is receiving increasing attention as concern about environmental problems grows year by year. This index includes some ofthe most important dimensions, which can affect the natural environment and characterize the quality of life. It develops a ranking among the selected countries (180), and it is published on an annual basis by Yale University and Columbia University in collaboration with the World Economic Forum. The EPI uses a specific approach, discussed later in this paper, which focuses on how close each country is to a predetermined goal. Using the published data by the EPI, we are going to develop a model in PROMETHEE. More specifically, in this paper, we are going to focus on the EU countries. Thus, we will use the published data of 2020 in order to process them with PROMETHEE, a well-known multiple criteria decision analysis method. The purpose of this work is to create a comparison of the two final rankings, EPI's ranking and PROMETHEE's ranking, studying how the two methodologies react to the final results, one methodology that compares its country's performance with a predetermined target (EPI) and the other methodology that makes pairwise comparisons between input data (PROMETHEE). For this purpose and intending to use as much detail as possible in our model for forming a similar base with the EPI, we are going to use the EPI's 32 indicators for PROMETHEE's comparisons, which are developed under two main categories, the category of Environmental Health and the category of Environmental Vitality.

keywords: multi-criteria analysis; PROMETHEE; Environmental Performance Index; EPI

# Multicriteria Based Analysis on the Type and Capacity of Hotel Accommodation: Classic Vs All Inclusive Hotel


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## Abstract

The need to compare Classic and All-Inclusive Hotels as two types of hotel operation at a technical and quantitative level was the focus of the present study. Initially, some reference sizes were selected regarding the dynamics of the hotels based on their capacity in rooms and the level of services offered. It was ensured that these sizes represented as similar products as possible to the tourism market and therefore competitive alternatives. In terms of capacity, three reference sizes were selected (400, 280, 150 rooms), while the services offered were defined in all cases as luxury five-star summer vacations. The types of hotel considered in the current research included: AII-Inclusive 400, AII-Inclusive 150, AII-Inclusive 280, Classic 400, Classic 150, Classic 280. A detailed description of the construction needs of the alternative hotels was analyzed. Then, the cost of construction was examined in detail in each case with a detailed recording of the differences between alternatives. Another group of criteria considers the cost of operation. After analyzing the various components that make up a hotel, regardless of size, the operating costs were considered for each category. Therefore, it is was possible to directly compare alternatives with real numerical data. Multicriteria analysis was employed using PROMETHEE method. In this case, the plethora of alternatives that are reflected in the different operating standards and sizes of the hotel units, makes the multi-criteria analysis an ideal methodology for ranking the selected hotel units. For the best approach to the issue, ten criteria are introduced, with the corresponding weights of each, as assessed by a panel of experts. Visual PROMETHEE suggested that the “Classic 150” was the best alternative, followed by “Classic 280” and then “All-Inclusive 150”.


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| keywords: | Multicriteria Analysis; Hotel Management; All-Inclusive Hotel; Classic Hotel; Visual PROMETHEE |

# Optimal segmentation of student classes for social distancing


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## Abstract


The pandemic situation due to COVID-19 forced activities that involve social gathering to postpone their physical operation. At some point in time, the critical situation is expected to de-escalate, and careful steps must be made to return to normality. New modes of operation for educational institutions, government agencies and various businesses emerge in the period between "closedown" and full normal operation. High schools, being much crowded places, restart their operation with segmented student classes of smaller sizes. Students are asked to be present at school premises day by day, to lower the risk of spreading the virus. So, an interesting scheduling problem arises. Given that before the "closedown", each student belonged to specific classes based on common courses and selected direction courses, a new grouping of students to classes is asked. The objective is to have the best possible balanced student classes according to students that were enrolled to the original classes, while keeping a near perfect balance between total students that are present at the school facilities every day. In this paper, the underlying optimization problem is formulated and test cases of high schools in Preveza, and Agrinio Greece are presented. The problem is solved using heuristics and Integer Programming (IP). Results comparison reveals the advantage of the IP approach since it reaches optimal solutions in negligible time.



keywords: social distancing; student class segmentation; heuristics; integer programming

# The Importance of Smart Eco-Social Villages in the Focus of Covid- 19 Pandemic


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## Abstract

While human interacts with nature in order to sustain life, ecological crises such as rapid consumption of resources, inequalities among individuals, air pollution and climate change that cause disruption in the balance of the ecosystem are observed. “Covid-19”, described as a biological disaster, an ecological and social crisis, is one of the important pandemics that continue to affect the world up to date.

The mortality rates associated with Covid-19 are quite high compared to other pandemics in almost all parts of the world, being the elderly who are 65 years old and older with chronic diseases in the first place. Isolated life based on both contamination risk and quarantine practices has caused many physical, mental, social and economic problems, and adaptation to the new normal has become difficult. Thus, the ongoing destructive effects of this pandemic at both individual and local levels have increased the need for smart ecosocial villages as sustainable alternative living spaces. These villages, which focus on sustainable rural development, consider digitalization as a facilitating tool in agricultural production activities. It is grounded on innovative services based on advanced technologies in rural development, and focuses on the development of rural infrastructure and strengthening local communities on the basis of participation, inclusion and democracy in the light of the local culture and environmental centered approach. The main objective of this study is to explain the importance of smart ecosocial villages in rural areas in the focus of the Covid-19 pandemic. Thus, the importance of smart ecosocial villages for sustainable rural development is discussed by evaluating the impacts of Covid-19 on the rural areas.

keywords: Covid 19; rural development; sustainability; smart ecosocial village

# The ranking of the Air Traffic Controllers' competencies: an empirical survey


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## Abstract

In a safety-critical domain, like air traffic control (ATC), the human factor plays a vital role. For this reason, personnel undergoes continuous training and is evaluated on various competencies according international standards, among them a set of competencies related with the social and cognitive side of Air-Traffic Controllers (ATCOs). Ten competencies are described by Eurocontrol, which are considered essential for the specific job positions. Nevertheless, our empirical evidence shows that situation awareness, among others, is the main competency under consideration in the working environment for the provision of air traffic control in the military and civil traffic. The level of situation awareness seems as the key-factor for the formation of shifts of ATCOs. Thus, in the current paper we examine the significance of the whole set of the "soft" competencies in the air traffic control in cooperation with experts in the field. Ten experts high-level military officers acting as ATCOs, responsible for many Greek aerodromes supporting military and commercial aviation traffic, shared their experience with us. The results confirm that situation awareness is the most important competence while the self-management and continuous development is the less important one. In addition, the results show that competencies are classified into three groups with respect to their significance, the "more" and the "less" important and an intermediate group.


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| keywords: | Air traffic control; air traffic control management; safety management; competencies; multi-criteria decision making |

# Honey Bees Mating Optimization Algorithm for the Berth Allocation Problem


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## Abstract

The growing demand of maritime logistics is developed from the research of maritime transportation within the context of supply chain management. The connection between supply chain integration and shipping firm performance reflects on the quality of the maritime logistics services. Therefore, complete maritime logistics systems involve a series of crucial operations: port management activities, shipping strategies and freight forwarding planning. Particularly, in maritime transportation, an effective and organized plan for ship arrivals is necessary prerequisite for the success of the entire port logistics. Handling a specific amount of ships depends on their arrival time, their handling or working time in the port and the availability of the current berth to service them. This specific set of acts is denoted as Berth Allocation Problem (BAP). The aim of the BAP is the allocation of berths to a set of vessels scheduled to arrive at the port within the planning horizon in order to minimize the sum of their waiting and handling time at the port. BAP is a NP-hard problem according to its complexity and it presents quite few similarities with the mathematical model of Multi Depot Vehicle Routing Problem with Time Windows (MDVRPTW). To tackle effectively BAP, we develop an innovative optimization method based on the natured inspired algorithms, which follow the behavior of bees. To solve BAP, we select the Honey bees mating (HBMO) optimization algorithm due to its adaptiveness in numerous optimization problems. HBMO belong to the category of evolutionary algorithms and their applications can be found in both continuous and discrete optimization fields. We compared the proposed algorithms with other algorithms from the literature and the computational results proved the efficiency of the methods for the studied problem.

keywords: honey bees mating optimization; berth allocation problem; maritime transportation

# A network DEA model for measuring the cross-country performance of secondary education


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## Abstract

We address the efficiency and productivity of secondary education provision by comparing the PISA results from the educational system of 65 countries. The Programme for International Student Assessment (PISA) is an international OECD project which assesses the students' academic knowledge and skills every three years. We propose a network DEA model of the education production process using a two-stage structure where in the first stage the relationship among teachers and students affects the disciplinary climate in the class while in the second stage the learning environment affects the student's performance in reading mathematics and science. It should however be noted that the students' perceptions with teacher and classroom environment are subjective measures which may reflect national or cultural differences. This can give rise to concerns about the validity of drawing comparisons across countries. To obtain more valid findings we focus on changes within countries rather than differences between countries. Therefore, in this study we use the cross- sectional data from the PISA survey from 2015 and 2018 to highlight the longer-term changes in secondary education across countries.

keywords: Data Envelopment Analysis (DEA); Efficiency; Productivity; Malmquist index

# Is mass production feasible by using 3D printing? The use of 3D printing in the fight of Corona Virus wave is an indicative case study


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## Abstract


Worldwide pandemic wave of coronavirus disease bring to front line a numerous of problems in health system, in government, in manufacture industry, in all aspects of public and private life. 3D printing technology during previous months becomes the most known technology which aims doctors and nursing staff to face COVID-19 and work safety. Nowadays, 3D printing industry is booster for the National Health Systems of the majority of affected countries. Hobbyists, Enterprises, Universities, FabLabs, print 3D Face Shields, Surgical Mask Strap, 3D Respirator Valves, printed adapters to turn snorkeling mask into a non-invasive ventilator, in order to protect both nursing staff and individuals. By observing the structure of these Initiatives, we conclude that 3D printing technology could be used for mass production under a different production model.

The goal of this work is to present how 3D printing could alter the production model. Apart from changes to supply chain, production chain and inventory, 3D printing could also transform the manufacture industry in terms of both operations and structure. The pandemic wave seems to be the accelerator of collaboration between 3D printing technology and the manufacture industry.

In this study, we review initiatives that have been implemented around the world using 3D printing technology during the pandemic coronavirus and we map the structure of all these initiatives. Based on the fact that the production was taken place at "work stations" scattered at different geographical areas, we examine how traditional factories could be reengineered and re-structured when 3D printers co-exist with traditional manufacturing resources. In more details, we examine how administrative and operational procedures change, how the organizational structure could change when machines or 3D printers are not located in factories' facilities. We claim that the mix of the above structures, could introduce a new type of factory, the "Network factory".


keywords: 3D printing; COVID-19; Manufacturing Industry; Network Factory

# Critical success factors of digital maturity: a multicriteria analysis


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## Abstract

A successful digital transformation is vital for organisations in the service industry. Although many prior studies have raised its importance and value, managers and decision-makers still focus on the implementation of information systems and applications denying to shift their thinking towards digital maturity and more strategic decision-making. The purpose of this research is to recognize and prioritize the factors of a successful digital transformation. In order to achieve this proposition, a digital maturity model has been designed focusing on a better understanding of digital transformation management. The identification of critical success factors was conducted by implementing a multicriteria methodology. Data was gathered via a structured questionnaire from professionals knowledgeable about digital transformation initiatives in a sample of Greek service small and medium enterprises (SMEs). Finally, the implementation of a multicriteria methodology examines the potential validation of a predictive model for more successful digital transformation strategies, based on a set of critical factors.


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| keywords: | Digital Maturity Model; Digital Transformation; Digital Strategy; Multicriteria Analysis; Success Criteria |

# Digital transformation effectiveness evaluation in Greek service SMEs using an ordinal regression analysis approach


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## Abstract

Digital transformation has been one of the most debated topics in business in the last decade. It is a systemic way for organisations to leverage new digital technologies in order to radically improve operations, performance, safety, and reduce costs. Focusing on the service industries in developing economies, digital transformation has a major role and the further investigation of its drivers and outcomes is significantly important. The digital transformation journey has a great contribution to the service organisation's success. The main purpose of this study is to evaluate the effectiveness of digital transformation in Greek service small and medium enterprises (SMEs). For this purpose, the drivers of digital transformation were explored and correlated with the organisational performance, as an outcome, of the service organisations through an ordinal regression analysis model. This model adopts a mathematical programming approach so that it estimates the efficiency of this process. For the purpose of the survey, a structured questionnaire was developed, including variables associated with all the stages of digital transformation. These variables were measured on a 5point Likert-type scale. The sample of the survey consists of 48 professionals who are involved in digital transformation initiatives. The main results of the research methodology include the estimated contribution of each factor to the overall firm performance of the Greek service SMEs studied.


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| keywords: | Digital Transformation; Organisational Performance; Digital Strategy; Ordinal Regression Analysis |

# Mapping Business Model Using Archimate: The case of Open Data Ecosystem


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## Abstract

Open data increases the value of an open data network between all the actors. While value network organizations may benefit greatly from the business opportunities provided by open data, the lack of value network and business models has been highlighted as the significant challenge to data usage in services and applications. Open data gives businesses numerous opportunities, such as developing new products and services. A major challenge for companies and governments is collaboration among data-providing actors, for data-consuming actors, and for actors developing new data services and applications. Those actors synthesize an ecosystem called the collaborative environment. Open data ecosystems are facing many obstacles and researchers have focused on establishing and validating these. From a business perspective the existing knowledge about the open data ecosystem is limited. The aim of this paper is to visualize the business model of open data ecosystem in Thessaloniki in order to discuss the relationships between the actors of the open data value network as well as the business model elements that are needed to support the activities of these entities in open data based business. Findings show that although actors are highly interested in using open data, a new form of business model is required that makes a win-win situation possible for all the actors in the open data environment. The results showed many motivations and benefits of an open data ecosystem. However, there are also barriers which need to be carefully resolved.

keywords: Open Data; Business Model; Ecosystem; Modeling; Archimate

# SIMULATION-BASED SCHEDULE RISK ANALYSIS IN A SEAWATER DESALINATION PLANT CONSTRUCTION PROJECT


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## Abstract

In the present study, we perform a simulation-based approach for considering risks of delay in projects and predicting the probability of in-time activity completion. The uncertainty of each activity duration is illustrated by the assignment of statistical distributions using a questionnaire answered by an expert. The main contribution of this paper is the development a customized questionnaire for risk factors identification specifically for a seawater desalination plant construction project, and the application of the appropriate statistical distributions to the activities' durations. In addition, Monte Carlo Simulation is used in order to quantify the level of risk that each task and the whole project are exposed to, and assist the project risk manager with a tool for accurately predict the actual project completion time moment. Also, the probability of completing the project at a given date, could be determined, as well. The proposed method applied for estimating the total project completion time of a real seawater desalination plant construction project, in the island of Allonissos, Greece. The present approach, compared to the classic PERT method, provide far more options to the project risk manager for handling effectively the uncertainty regarding project task durations and deadline critical overruns.

keywords: Project risk management; monte carlo simulation; duration uncertainty; project scheduling

# Risk Analysis and Resource Leveling of an Artificial Lake Construction Project


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## Abstract

In this paper, we perform analysis of risk factors with impact to the duration of activities and to the total project makespan. The project time uncertainty is assigned to tasks via the assignment of statistical distributions, and Monte Carlo Simulation used to estimate the real level of risk that each activity and the total project are exposed to. These risk levels are used to construct a risk ascending list of activities which is used as a priority list during the resource leveling process. The main contribution of this paper is the development of an approach that uses the risk levels for each activity in order to construct a prioritization approach for assigning constrained resources to activities of uncertain durations, while minimizing resource usage fluctuations. Several different scenarios of the proposed risk-aware priority rule have been tested and its functionality is tested against classic approaches.

keywords: uncertainty; delay; monte carlo simulation; priorities; resource levelling

# The adoption of cloud computing in public sector: a systematic literature review


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## Abstract


Cloud Computing is an innovation which radically transforms the way that information and communication services are provided and is considered as a catalyst for the adoption and utilization of cutting-edge technologies that will affect every aspect of economic and social activity in the following years (IoT, Blockchain, etc.). European Commission considers cloud computing as one of the main disruptive technologies that will contribute not only to the growth of the economy but also to the digital transformation of both private and public organizations. Especially in the public sector and according to OECD, cloud computing can lead to cost-savings, reduction of the total cost of ownership, high availability of information systems and services, provision of improved and enhanced capabilities to the employees, new or improved services to the citizens and more open, innovative and reliable authorities, both in central and in local government level.

Therefore, public sector and more specifically local government authorities should understand cloud computing benefits and challenges and recognize the factors that influence its adoption, in order to incorporate it into their strategy and their initiatives for digital transformation in the following years. However, as a number of authors argue (Wang et al., 2016, Jones et al., 2017, Senyo et al., 2018), scientific research concerning cloud computing adoption issues is rather limited, especially in public sector and more specifically in local government.

The aim of this paper is to perform an extensive systematic literature review, based on methodologies proposed by Kitchenham & Charters (2007), Okoli & Schabram (2010) and Bandara et al. (2011). In this review, articles that examine cloud computing adoption are identified, coded, classified and analyzed, beginning from the private sector and then focusing on the public sector and more specifically in local government, revealing and highlighting theoretical, practical issues and factors influencing cloud computing adoption.



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| keywords: | Cloud computing adoption; public sector; local government; digital transformation |

# A Modified BLOCPLAN Algorithm for Unequal Area Facility Layout Planning


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## Abstract

BLOCPLAN is a simple facility layout algorithm that arranges rectangular departments into horizontal bands. To design a new layout, BLOCPLAN first generates an initial plan by randomly assigning departments to bands. By using the initial layout, it performs exchanges between departments to create alternative solutions. The exchange of departments continues until an improved plan is obtained. One disadvantage of the BLOCPLAN algorithm is that the quality of the final solution is highly dependent on the randomly generated initial layout. To overcome this problem, the process is often replicated multiple times with different initial layouts. However, the effect of having numerous initial layouts diminishes as problem size gets larger. In our study, we are proposing an alternative exchange mechanism that prevents premature convergence, and that generates a better final solution irrespective of the starting layout. In traditional BLOCPLAN, only a two-way exchange of departments is allowed. In our proposed approach, we still use a two-way exchange, but we also permit one-way removal and insertion of a single department. This is achieved by defining virtual departments with zero-width between actual departments. By allowing exchange between a real and a virtual department, we mimic the removal-insertion process of a department. The removal-insertion, in conjunction with standard two-way exchanges, expands the search space for alternative solutions and gives better convergence and high-quality final solution as compared to standard two-way exchange.

keywords: layout planning; blocplan; facilities planning

# Student perception on Entrepreneurship Program learning: Insights from GUESSS


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## Abstract


Entrepreneurship education is essential for the development of entrepreneurial skills and an entrepreneurial mindset among students. Universities, all over the world nowadays, offer entrepreneurship related courses (compulsory or elective) and other offerings. The research results regarding the effect of entrepreneurial offerings on student entrepreneurship though, are inconsistent, with some showing a positive and some even showing a negative effect. Additionally, the share of nascent and active entrepreneurs remains relatively low among tertiary students, and only a small share of students would like to become entrepreneurs directly after their studies. The aim of this paper is to assess the perception of program learning as an indicator of entrepreneurship offerings effectiveness by different groups of students (active, nascent, dreamers and abstainers) and to identify those that benefit the most out of offerings.

In this paper, we analyze a student sample from 50 countries of the "Global University Entrepreneurial Spirit Students' Survey" (GUESSS 2018). Results show that active, nascent entrepreneurs and (intentional) dreamers have greater benefit from university offering, than (non-intentional) abstainers. Moreover, the number of those choosing the founder career option on the long term seem to have a greater benefit, compared to those choosing a career as a founder right after studies. Also, compulsory courses as part of student studies seem to have more benefit than elective courses. Finally, differences are observed between business and engineering students.

These results offer valuable insights for the impact of entrepreneurship education to educators. We propose that entrepreneurship offerings should be redesigned to fit the special needs of different groups of students.


keywords: entrepreneurship education; career choice; GUESSS; program learning; students

# Computer self-efficacy as an antecedent of entrepreneurial intention


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## Abstract

The evolution of Information Technology has undoubtedly made a significant contribution to many entrepreneurial success stories in the last decades. Computer Self-Efficacy is an IT specific measure of the general ability to use computers and software and its relation to entrepreneurial intention, a valid precursor of entrepreneurial behavior, consists an interesting topic which recently came into focus of entrepreneurship research. In this empirical research conducted among secondary education students, the efficacy of autonomous use of computer software is highlighted as an influential factor for the entrepreneurial intentions of students. Autonomous use of computer software incorporates increased learning motivation, risk undertaking and openness to new experiences, which are essential for entrepreneurship. The findings have useful implications both for instructors and software designers.

keywords: entrepreneurial intentions; computer self-efficacy; students

# Modelling and Optimization of the Real-life Crop Rotation Problem in Serbia


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## Abstract

The study focuses on the real-life problem of crop rotation in Serbia. Searching for the most appropriate crop sequence has drawn attention for a long time, but the problems in literature differ from many aspects due to the different crops, soil, climate factors and their characteristics, available equipment, resources, demands of the farm management and many others. Therefore, the problem that we considered is a specific one and according to our knowledge cannot completely fit in the already developed mathematical models and proposed solution methods. From the aspect of the farm, the goal is to maximize the profit under specific constraints from practice: limited land area, lower and upper bounds of area under considered vegetables and crops, their characteristics and the appropriate order of semination. The 0-1 nonlinear programing model is proposed and tested using exact Lingo solver. Optimal solutions are provided only for small-size instances that are generated following the structure of a real-life instance with minor adapting of the input data to fit the smaller area field. In addition, an approximation of a solution of a larger-size real-life instance is provided by dividing the total area into equal fields, considered as units of land instead of hectares. According to the obtained results, it can be concluded that developing an efficient metaheuristic method for the considered problem is a good choice in order to provide more precise, high quality solutions for larger-size real-life instances. The results represented in this paper can be used as a benchmark for testing the performances of the future developed approximate solution methods.

keywords: Crop rotation; Optimization; Mathematical modeling; Agriculture

# A Multi-Criteria Methodology for Market Segmentation based on the Analysis of Consumer Choice Criteria


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## Abstract


The proper market segmentation is a key problem in marketing with great impact on the success of importing a product or service into a market segment. Multi-criteria decision analysis contributes to solving the problem of market segmentation through the analysis of criteria on the basis of which the consumer/customer (decision maker) expresses his preferences when purchasing a product or service. The MARKEX methodology dealt with the problem of segmentation of the market based on the analysis of the criteria.

The aim of this work is the development of a methodology that will improve the proposed by the Multi Criteria Decision Support System MARKEX methodology, by expanding the criteria analysis, adding a second layer of examination that will allow the further extraction of information from the same data and the deeper understanding of the competition between the products/services and their weak and strong points in reference to the criteria. The more in-depth analysis of the criteria obtained by the addition of a clustering algorithm and the NAI algorithm. Through this expansion of the analysis, the criteria that constitute the basis for the market segmentation will be determined with more precision and lead to a more detailed and accurate market segmentation.



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| keywords: | Multi-criteria decision analysis; Decision Support Systems; Criteria Analysis; Clustering; Market Segmentation; Marketing |

# Development of a web-based multi-criteria decision support system for benchmarking


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## Abstract


The possibility to compare alternatives is a useful tool and provides useful information to decision-makers in businesses and organizations. Such features with many applications were proposed and included in the MARKEX system. The current demands of the market and decision makers, as well as the new possibilities and developments in technology and research, have forced the expansion of capabilities and the development of a new web-based decision support system.

In this work, a web-based decision support system for market analysis and simulation is presented, which implements the MARKEX methodology. The aim is to study consumer behavior, market segmentation and competition analysis.

The system has been developed and operates as an educational tool and has the potential to add new research efforts. Its databases are based on data from special market research. The system's model base so far includes the UTASTAR multi-criteria methodology, the Negotiable Alternatives Identifier (NAI) algorithm, and brand choices models. The system works in a web environment and has been developed in python and javascript languages. The presentation of the system will be through its application in market research data for extra virgin olive oil products in the French market.


keywords: Multi-Criteria Decision Analysis; Decision Support Systems; Benchmarking; Marketing

# Estimation of choice model for parcel delivery services


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## Abstract

The rapid growth in e-shopping has driven to a large extent business to consumer (B2C) parcel deliveries. Whereas the parcel delivery service is an Agreement between the Transport Service Operator with the E-retailer, the service level of Agreement is determined by consumer demand. The critical element to complete an electronic purchase is the physical delivery, therefore particular attention should be given to the service provided to the customer. The aim of this paper is to use a multinomial discrete choice model to analyze the service attributes that consumer consider more important. These attributes such as: delivery place, time and speed, track and trace, value-added services and delivery cost constitute four alternative delivery services. Stated Preference Experiments were developed to collect data on respondents' choices among hypothetical situations. Results have shown that consumers prefer Free Delivery Service but they are willing to afford a higher price if they have the option to choose a more advanced parcel delivery service providing a higher service level.


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| keywords: | e-shopping; parcel delivery services; multinomial discrete choice model; Stated Preference Experiments |

# Location Based Marketing Survey for Smartphone Users


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## Abstract

Digital Transformation of businesses is a beneficial aspect that can provide added value and satisfy customers' desires on the way to the transaction. Such useful strategies are being offered by Location Aware Marketing (LAM) which utilize new smartphone capabilities and apply Location based personalized content to improve the product and the brand awareness. Location Based Services (LBS) are a powerful ally on the way to mobile advertising content, that seems to gain higher attention along with the IoT. Our research investigates the LBS potential through the eyes of end-users with the assistance of a questionnaire that examines the key roles of user characteristics and how they influence their ability and volition to accept and use Location Aware Marketing content and technologies through their smart-devices. Our statistical analysis on the received sample reveals the correlation between individual aspects of user behavior and the concepts of LAM usage on their daily routine.


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| keywords: | Location Aware Marketing; Location Based Marketing; Location Based Services; Smartphone Applications |

# Literature Review of Location Based Services


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## Abstract

Location Based Services (LBS) are utilizing sensors from smart devices and provide accurate positioning estimation for end-users on indoor and outdoor environments. With IoT getting higher recognition amongst regular users a variety of daily tasks is getting depended on the efficiency of service providers and enablers in order to be executed successfully. With a market that is growing and demanding better indoor and outdoor solutions for real time positioning estimation, enterprises are competing each other on technological research and development of new products and services. Realtime Location Data seems to get higher attention from academics and researchers, because they provide with useful information for both end-users and enterprises. Businesses can study such data in order to have indications regarding the user-behavior of potential customers which brings “managerial dimensions” into LBS. This research focuses on the academic research of LBS in order to reveal potential gaps and research opportunities for specific scientific fields in the future.

keywords: Location Based Services; Location Based Marketing; Literature Review; User Behavior

# An application of DEA to measure the efficiency of leading airlines


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## Abstract

This paper provides the efficiency analysis of the 30 world leading airlines in 2017 and 2018. Two Data Envelopment Analysis (DEA) models with three inputs and three outputs are developed to assess and optimize the airline efficiency. The basic model evaluates the efficiency of the selected airlines providing satisfactory results. In order to improve these results and to evaluate the operation indicators which affect airline efficiency with the different level of significance, the weighted DEA model is proposed. The weights of inputs and outputs are derived by Analytic Hierarchy Process (AHP). The results include a benchmark, airlines ranking and the directions for improving the efficiency of inefficient airlines.

keywords: Airline efficiency; DEA; weighted DEA; AHP

# A Clustering and Statistical Forecasting Approach for Replenishment of Common Spare Parts in the Maritime Industry


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## Abstract

This paper presents the results of research conducted on behalf of a Greek ship management company operating a sizeable fleet of commercial maritime vessels. The first objective of this study is to develop a methodological approach for the application of appropriate clustering techniques in order to identify Common Spare Parts (CSP), i.e. spare parts that are common in more than one vessel. The successful implementation of the clustering process led to the elaboration of the CSP dataset including all available information on the items' characteristics and order history. This is a critical step for the success of the proposed approach, since including accurate data in the initial dataset is considered essential for the efficiency of both the purchasing and fleet maintenance processes. Next, this study proposes an approach based on a pair of statistical forecasting manipulations on the available data leading to reduced forecast error, lower inventory carrying costs and eventually reduced cost of purchasing and replenishment. The proposed approach is consisted of two components, i.e. the statistical forecasting component, which calculates the demand for CSP and the cost optimizer component, which yields a minimized total cost solution across the entire supply chain. The application of the proposed clustering and forecasting approach in the case company, produced ambitious results leading to a reduction of the total replenishment cost of 16,4%.


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| keywords: | maritime logistics; replenishment; common spare parts; clustering; machine learning; forecast error |

# Setting the Basis and Designing the Data Architecture for the "EN.I.R.I.S.S.T." Research Infrastructure


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## Abstract


Within the past years, the transportation sector has been affected by the several advancements occurring in the era of big data. This has increasingly attracted the attention of both scientists and practitioners in the private and public sector and several studies and applications have been developed in this field. Despite the many advantages of big data, several challenges should be addressed to gain the full potential of big data. On the one hand, data analysis is very complex as it consists of multiple phases including data acquisition, processing, aggregation, and delivery. On the other hand, the appropriate big data tools and services should be applied. Therefore, designing an optimal data architecture is crucial.

This paper focuses on the Intelligent Research Infrastructure for Shipping, Supply chain, Transport and Logistics (EN.I.R.I.S.S.T.) which is a unique and innovative Research Infrastructure (R.I.) established in 2019 in Greece in the context of the National Strategy for Research, Technological Development and Innovation (2014-2020) in the National Roadmap of Large-Scale Research Infrastructures. The aim of this paper is two-fold. First, it will provide the current state-of-the-art on the established research infrastructures in Europe and worldwide. The review will identify the best practices adopted to formulate sustainable e-infrastructures that provide continuity addressing long-term changes but are flexible enough to respond to the modification of research priorities due to the rapid societal and technological developments. In addition, it will present the data architecture that will be developed in the context EN.I.R.I.S.S.T. Its goal is to become a widely acceptable, multi-purpose data analytics platform that will unify a wide variety of open data sources and enhance collaborations among different disciplines in the transportation sector. The Infrastructure relies on the NIST Big Data Reference Architecture supporting data

cataloging, virtualization, analytics and visualization through the use of open source tools.

keywords: research e-infrastructure; transport; logistics; innovation; big data; data analytics

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# Exploring the factors which impact the level of international students and international faculty members: The case of world-leading universities


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## Abstract

The level of internationalization of universities proved to be a valuable tool which can attract the attention of various stakeholders, from beneficiaries to corporations looking for partnership. Therefore, universities are slowly, but surely starting to strategically act regarding their activities to attract international students and lecturers. Herein, we strive to explore the factors which impact the level of international students and faculty members on a world-leading university. To do so, we applied path analysis, a type of structural equation modelling (SEM) analysis. The analysis was applied on the data retrieved from the Academic Ranking of World Universities (ARWU) and QS World University Rankings for the year 2019 The suggested approach can provide insights on the mechanisms which attract international students and faculty members and can serve as a foundation for future research on the development of internationalization strategies of universities.


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| keywords: | Universities; internationalization; international students; international faculty; path analysis |

# A Blockchain Technology implementation for Cold Supply Chains


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## Abstract

Blockchain is considered a cutting-edge technology, quickly reaching a maturity phase with more and more applications emerging in the business sector. The two main benefits are data integrity and its capability of applying Smart Contracts. Digital Supply Chains (SC) could benefit from the Blockchain Technology (BCT) in order to secure data sharing across multiple stakeholders however, this potential is still untapped due to the challenging integration of BCT. This need for integration along with the use of other prominent digital technologies like the Internet of Things (IoT), propel novel business models that should be further examined. We propose the integration of BCT in the food and beverage supply networks with a special focus on the cold SC ecosystem in order to increase traceability in a farm-to-fork-perspective. In this context, a cold supply chain business model was designed using the Hyperledger Fabric while Smart Contracts ensure the execution of transactions among the stakeholders.

keywords: Digital supply chains; cold supply chains; blockchain; smart contracts

# Evaluating users' acceptance and satisfaction in e-government: The case of IRIDA system


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## Abstract

The application of ICT in the field of E-Governance is a fast evolving research field aiming to provide high quality administrative services to the citizens. In the era of Information Society, digital transformation becomes a matter of top priority in the field of public administration. This paper studies an electronic documents management system (IRIDA) as a framework for processes re-engineering and modelling. IRIDA is a new, more efficient, faster, safer and more transparent system which is used in the Ministry of Interior for the central management and handling of documents. Furthermore, under the prism of stuff performance improvement and cost reduction, this work attempts to thoroughly explore the factors that affect users' acceptance and satisfaction with the IRIDA system. The research methodology was based on a questionnaire that was disseminated to 498 IRIDA users. Data were analyzed using Regression Analysis. The results reveal that the quality of the system as long as the quality of information has positive effect on the overall satisfaction of the employees. Furthermore, the perceived ease of use and the perceived usefulness of the system do positively affect the overall satisfaction of the employees. However, the overall satisfaction of the employees is not increased by the quality of the service.

keywords: Information Systems; User acceptance; Satisfaction; E-government; Digital transformation


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