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ABSTRACTS

GOL'20

Co-organized by :

Mohammed V Univesity of Rabat, ENSIAS, Rabat, Morocco

Sidi Mohamed Ben Abdellah Univesity, FSTF, Fes, Morocco

Le Havre Normandy Univesity, Le Havre, France

ENSIAS, Rabat, Maroc

October 28-30, 2020

Actes de la 5ème édition de la conférence IEEE internationale

Gestion Opérationnelle de la Logistique

RESUMES

GOL'20

Co-organisée par :

Université Mohammed V de Rabat, ENSIAS, Rabat, Maroc

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Préface

Après la réussite des quatre premières éditions de la conférence internationale IEEE Gestion Opérationnelle de la Logistique, nous voici aujourd'hui entrain de réussir notre pari en organisant la 5ème édition à l'ENSIAS de Rabat. Cette édition marquée par la pandémie Covid 19 qui touche tous les pays du globe, vise à réunir, à distance, chercheurs et professionnels concernés par la logistique au sens large autour de thématiques relevant des sciences de l'ingénieur, des STIC ainsi que des Sciences Humaines et Sociales. Cette rencontre multidisciplinaire est l'occasion de dresser un état des lieux des nouvelles pratiques de gestion opérationnelle des différents flux logistiques.

La conférence, coorganisée avec l'université Sidi Mohamed Ben Abdellah de Fès et l'université du Havre Normandie, en partenariat avec l'Aassociation Marocaine de la Chaîne Logistique (AMCLog) se tient du 28 au 30 Octobre 2020 avec la participation d'une centaine d'enseignant-chercheurs et industriels venant de 13 pays: Algérie, Allemagne, Canada, Émirats Arabes Unies, États Unis d'Amérique, France, Maroc, Oman, Pakistan, Romanie, Russie, Rwanda et Tunisie.

En plus des quatre conférences plénières de cette édition, les communications sont réparties en 14 sessions thématiques aussi diverses que la gestion de la chaîne logistique, les tournées des véhicules, la gestion des risques, les technologies mobiles, les systèmes de transport, la logistique inverse, la logistique portuaire, la logistique hospitalière, la production, les systèmes d'information, la modélisation et la simulation. Nous tenons à remercier les conférenciers invités ainsi que tous les participants.

Pour cette 5ème édition, nous avons reçu un 74 articles et nous n'avons retenu que 62 ayant reçu une moyenne positive des évaluateurs choisis parmi les membres du comité scientifique. Tous les articles retenus sont publiés dans ces actes de la conférence et ceux répondant aux critères de IEEE Xplore seront proposés pour publication sur son cite. Comme à chaque édition, nous sommes heureux de proposer, pour GOL'20, un numéro spécial dans chacune des revues suivantes: «International Journal of Supply and Operations Management» et «International Journal of Logistics Systems and Management».

Pour l'organisation de la conférence, nous avons bénéficié du soutien financier de l'**ENSIAS**, du **CRNST** et de l'Aassociation Marocaine de la Chaîne Logistique (**AMCLog**). Nous tenons à leur exprimer notre profonde gratitude pour leur soutien précieux. Nous tenons aussi à remercier la Directrice de l'ENSIAS de son soutien continu ainsi que le corps administratif et le personnel de leur aide tout au long des préparatifs.

Enfin, le comité d'organisation a décidé que la 6ème édition de GOL soit organisée à la FST de Fès en 2022.

Youssef Benadada
Président de la conférence GOL'20

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Plenary Sessions

Ammar Oulamara, Faculty of Science and Technology, Lorraine University, France

Title : *"Ecosystem of Electric vehicle: from smart grid to logistics"*

Abstract:
Electric vehicles have a positive impact on the economy and the environment since they use alternative energy sources. They reduce dependence on oil, decrease gas emissions and improve air quality. Although the acquisition cost is still high, this cost is nevertheless offset by the use of these vehicles, where the operating cost is very low compared to combustion engine vehicles, mainly due to the price of electrical energy and reduced maintenance costs. Although the available electric vehicles meet the needs of professionals, nevertheless three weaknesses remain in the use of electric vehicles, namely, limited range, charging time and the availability of charging infrastructures, and are part of the research and development challenges of all car manufacturers and public research centers. In this talk we review the different challenges related to the use of electric vehicles in transport and mobility. More precisely, we introduce several optimization problems of the ecosystem of the electric vehicle, from smart grid to logistics.

Short Biography:
Ammar Oulamara is a Professor in the Faculty of Science and Technology, Lorraine University, France. He received a Ph.D. degree in Computer Science from the University of Grenoble. He then joined the Mines school of Nancy where he served as an associated professor in the Department of Industrial Engineering until 2012. In 2012 he joined the university of Lorraine as Professor in Computer Science. His research interests are in operation research and combinatorial methods applied to scheduling, transportation, logistics and mobility. He has published papers in many operational research journals. His research work has enabled technology transfer and the creation of the route optimization software, antsroute.com

Agostino G. Bruzzone, Professor in DIPTEM, University of GENOA*,*
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Abstract : Logistics and operations are complex systems where well know & critical VUCA factors (Volatility, Yncertainty, Complexity and Ambiguity) are present and generate challenges in management and operations. Due to these reasons the use of innovative approach such as Strategic Engineering is crucial to support decisions.
In this sense to develop new architectures as component of a modern Strategic Engineering approach based on combined use AI, M&S and Data Analytics provides a competitive advantage. Indeed, Modeling and Simulation (M&S) is crucial, in combination with AI, to find solutions of many actual problems in various fields, starting from training of personnel and up to strategic planning and management. In this invited speech, it is proposed to develop the concept of Strategic Engineering and related Simulations to create new capabilities in strategic decision making including preparation of new generations of M&S developers and users, capable to utilize these new approaches for problem solving and strategic planning.
Nowadays, the world faces numerous problems caused by Geo-political situations and fast evolution of society, which affect humanity in different ways; logistics is heavily impacted by this elements while technology advances provides new opportunities serving as enables of new processes and way to operate. For instance, changing the economic and political situation is otherwise causing alternation of approaches to public safety and security: in August 2015 we had the terrible accident in Tianjin port followed this year by the tragedy of Beirut port: same cargo explosion due to different reasons resulting in a disaster. At the same time, many of the great opportunities of changes are introduced by recent technological advances, which could be observed in virtually all fields, starting from communication and interconnectivity and up to IoT (Internet of Things), Big Data and AI (Artificial Intelligence). Obviously, new technologies and approaches create new challenges, however, in case of proper understanding of their potential they could be seen also as opportunities, which would allow to analyze, foresee and solve critical strategic several issues of the modern world. In facts, the necessity of proper Strategies in Logistics in order to succeed is well known, however, the understanding of its indispensability in management and control should be outlined and supported by innovative methodologies. For instance, according to Jomini, «Strategy is the art of good direction» («La Stratégie est l›art de bien diriger», Jomini, Prècis de l›Art de la Guerre, 1838) and in the same time period Von Clausewitz stated that "we need a philosophy of strategy that contains the seeds of its constant rejuvenation, a way to chart strategy in an unstable environment" (Vom Kriege, 1832). These concepts are still cornerstones and valid in general operations, management and, obviously in logistics; so they need to be reviewed based on new technologies, in order to succeed today, so it is critically important to rely on strategic planning and strategic management, which in its turn requires Artificial Intelligence, Intelligent Agents, new Simulators and Models capable to deal with the current level of complexity of the world. In particular the Intelligent Agents are fundamental to create realistic scenarios taking care of high number of entities and players

that act, interact and react to boundary conditions evolution, among themselves and to our decisions. Obviously, in order to create and utilize properly such technologies it is necessary to apply proper approaches and engineering methodologies. In this context it is important to highlight a new simulation paradigms which allows to partially solve the mentioned issues by improving interactivity of simulation and involving more regular users. In fact, this speech proposes to develop a Cooperation in Operations, management and Logistics on the Strategic Engineering in terms of promoting Education in Academia, Professional Development of Experts, Development of Solutions, Simulation and Exercises applying Strategic Engineering as well as to Develop Experimentation and Training in this context by creating and utilizing new models, highlighting importance of preparation of personnel responsible for strategic decision making.

Biography:

Full Professor at DIME, University of Genoa, Italy, Prof.Bruzzone is actively involved in the scientific community from early 90's and served as Director of the McLeod Institute of Genoa (MITIM), Associate Vice-President and Member of the Board of the SCS (Society for Modeling & Simulation International), President of the Simulation Team, President of the Liophant Simulation, VicePresident and Member of the Board of MIMOS (Movimento Italiano di Simulazione), Director of M&S Net, President Simulation Team, President of the Master in Industrial Plant Engineering and Technologies of Genoa University, Industrial Relation Chair in SCS Europe, Italian Point of Contact for the ISAG (International Simulation Advisory Group) and Sim-Serv. He was General Chair of European Simulation Symposium 1996 (Genoa), Websim1999 (San Francisco), Summer Computer Simulation Conference (20032006-, Montreal, San Jose', Philadelphia, Calgary), Summersim (20102012- Ottawa, The Hague, Genoa), I3M (20042012-, Genoa, Marseille, Barcelona, Bergeggi, Campora SG, Tenerife, Fes, Rome, Wien) He served as Project Leader M&S for NATO Science & Technology Organization for M&S at CMRE - Centre for Maritime Research and Experimentation establishing the new NATO R&D track on Simulation that is still active.

He is currently President of MIPET – Master in Industrial Plant Engineering and Technologies (Master Universitario di II Livello) and Council Chair of STRATEGOS, the MSc in Engineering Technology for Strategy and Security (1st Laurea Magistrale in Strategic Engineering in Italy and among first ones world wide) in Genoa University

Elkafi Hassini, Professor in McMaster University, Canada

Title : *"Optimization with big data: Applications to supply chain management"*

Abstract:
With the increasingly wide availability of big data, our ability to process or solve complex optimization problems is limited even with the state-of-the-art solvers such as Cplex. In this talk we present SparcPlex, a new big data optimization platform that integrates the strengths of Cplex and the popular Apache Spark big data platform. We will describe the main features of our new platform and discuss two industrial case studies that motivated this research with two major Canadian logistics and retail companies

Short Biography:
Elkafi Hassini is a professor and chair of Operations Management at the DeGroote School of Business. He is also Vice Chair of the Smart Freight Centre, and Research Director for Supply Chain Analytics at the MiSCAN Lab, and an associate faculty member of the School of Computational Science & Engineering, and the eHealth program. He currently serves as a coEditor-in-Chief of the journal INFOR: Information Systems and Operational Research, the flagship journal of the Canadian Operational Research Society (CORS). Among his current research projects are big data optimization is supply chains and last mile freight distribution and warehouse management

Issmail El Hallaoui, Professor at Polytechnique Montreal, Canada

Title : *"PIP Solver 2.0: Theory and Applications"*

Abstract:
In this talk, I will introduce the version 2.0 of the PIP (for Primal Integer Programming) solver, which finds at each iteration a descent direction leading to an improved integer solution, most of the time with no branching at all, until a near optimal integer solution is found. The solver can integrate primal exact and heuristic techniques in a highly fluid manner and thus we conciliate both communities. The theory behind will be discussed and illustrated. A good part of the talk will be dedicated to the implementation and architecture of the solver and also to discuss some of its successful applications to transportation problems.

Keywords: integral simplex using decomposition, primal integer programming, primal heuristics, transportation.

Short Biography:
Issmail El Hallaoui received his engineering degree from ENSIAS in 1996 and M.Sc. and Ph.D. degrees in operations research from Polytechnique Montréal in 2002 and 2006 respectively. He is currently professor of operations research at Polytechnique Montréal.
He occupied visiting positions at some prestigious universities like MIT (Massachussets Institute of Technology, USA) and University of Waterloo (Canada).
He pioneered several exact primal approaches for efficient (re)optimization of hard combinatorial problems. He is also active in the field of real time optimization. He publishes regularly in prestigious operations research journals. His research is well supported by Canadian and Quebecer funding centers and by the industry. He is distinguished this year by appearing in "Recherche en Vedette" of FRQNT (Quebecer Fund). More information can be found here.

Session S1W1 : Hospital and pharmaceutical logistics

A New MIP Model and Machine Learning Approach for Home Health Care: Optimization of Cancer Treatment Process by Chemotherapy

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Abstract

For several decades, New Information and Communication Technologies (NICTs) have been developing rapidly in the healthcare sector. They are now more and more present in the healthcare system and in particular in Home Health Care (HHC). Our study focuses on oncology which is among the most commonly treated diseases in HHC. Oncology techniques are ranked second in terms of stays in HHC, of which cancer chemotherapy is a part. Cancer treatment with chemotherapy is complex, cumbersome and very expensive. It requires drugs that are very expensive and they are very chemically unstable with usually a lifetime of a few hours, so any prolonged delay between the time of their preparation and the time of injection to the patient involves their destruction. This implies safe transport and administration of the drug within a time frame compatible with the validity of the drug. In this paper, we are interested in improving the quality of treatment service of chemotherapy in HHC by optimizing the delivery of anticancer drugs to patients. Our work is divided into two parts, first, we propose a new MIP Model for nurses scheduling. Our model aims to minimize the delivery time of drugs. In the second part, we propose a new learning approach based on Genetic Fuzzy System. It is applied for the first time in the field of health care and in particular in HHC. This approach is used to deal with the problem of uncertainty for the quantity of drug to be delivered.

Daily scheduling and routing of home health care with stochastic travel and service times

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Abstract

Abstract—The Home Health Care (HHC) is a wide range of health care services provided in patients' homes in case of illness, aging or injury. Each caregiver has to visit assigned patients while respecting the schedule given by the decision maker. Deterministic models ignore the uncertainty that could happen, which will cause to not respect the schedule fixed by the decision maker and tardiness of services operations could be occurred at patients. In this work, a stochastic programming model recourse (SPR model) is proposed to deal with the Home Health Care Routing and Scheduling Problem (HHCRSP) with stochastic travel and service times. The objective is to minimize the transportation cost and the expected value of recourse caused by patients' delayed services and caregivers' extra working time. Monte Carlo simulation is used to estimate the expected value of recourse. The deterministic model is implemented and tested using CPLEX IBM, the Genetic Algorithm (GA) based heuristic is coded and tested using the language C++. Computational results show the complexity of the SPR model in terms of CPU running times.

The Robust Nurse Scheduling Problem

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Abstract

the assignment of nurses to shifts is a crucial problem in hospitals. It requires a good scheduling to ensure the
minimization of overall hospital costs and to take into consideration the preferences of the nurses. We propose a ne wmathematical formulation for the nurse scheduling problem (NSP) where we integrate some new constraints. In addition to the deterministic model, we also propose the robust version for dealing with uncertainties using the worst case criterion. The solution approach and a real application will be the subject of a future work.

Managing Stakeholder Participation in Transport Decision Making: Perspective of Public Pharmaceuticals Supply Chain in Morocco

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Abstract

Including an active participation of stakeholders along the transport decision-making process is widely
recognized as a precondition to ensure effective outcomes.
Appropriate techniques and tools are needed to managesta keholder participation process towards well-thought and shared solutions. This paper provides a state-of-the-art overview of techniques and practical tools to determine who should participate in the decision making process, when and how. An illustrative example of managing stakeholder engagement in deciding on the appropriate transport network design option for the Moroccan pharmaceutical supply chain is presented.

Session S1W2 : Machine Learning

A Systematic Literature Review of Machine Learning Applications for Port's Operations

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Abstract

In this paper we construct an algorithm based on morphological filters, for large scale global optimization, for optimizing functions in big dimensions, we introduce firstly the theory of morphological filters, secondly, we will construct an algorithm based on this theory before implementing it. A panel of various benchmark problems with different properties were used to assess the performance of the proposed Optimization morphological filters (OMF) algorithm. The obtained results has shown the scalability of the algorithm in contrast to optimization algorithms encountered in the literature. Moreover, in comparison with some state-of-the-art metaheuristics (PSO, CuCkoo, Bat...), the computational results revealed that the proposed OMF algorithm is an effective and efficient optimization algorithm

Simulation as a decision-making tool in a business analytics environment

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Abstract

Nowadays, Business Intelligence (BI) plays a key role in the decision-making chain given the possibilities offered in terms of data availability, structuring, organization and reporting to facilitate decision-making. Despite its advantages in terms of historicizing the company›s activity, traditional BI tools do not allow us to project our business into the future and evaluate the impact of a decision on the entire activity of a company. With this in mind, What-if analysis positions itself as a data-intensive simulation to examine the impact of a decision.

Is Machine Learning Revolutionizing Supply Chain?

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Abstract

The current supply chain ecosystem benefits from a great dynamic: the digitalization of companies and exchanges. For all the players in the sector, this is a real revolution, and machine learning is at the heart of this revolution. It has radically transformed companies: the evolution of communication media, the automation of many processes, the growing importance of information systems, etc. However, this fundamental transformation of work environments and organizational modes is far from over. In the current economic context of globalization of trade and increased competition, the greatest attention is focused on the objective of continuously reducing cost prices. Optimization requires efforts from all links in the supply chain to ensure very fine management. In this context, machine learning and the data on which it is based is a real opportunity. In more recent years, a series of practical supply chain applications of machine learning (ML) have been introduced. By interconnecting the ML methods applied to the SC, the document indicates current SC applications and visualizes potential research gaps. In this article, we examine the applicability of machine learning techniques to the supply chain. The main objective of this paper is, therefore, to study how Machine Learning can be integrated into the range of tools available to Supply Chain decision-makers to take advantage of the increase in the volume of available data, through these tools particularly adapted to this type of processing.

Session S1W3 : : General Pickup and Delivery Problem

Etude comparative entre trois méthode de résolution du problème de tournées de véhicules dynamique mutli-tours avec overtime (MTDVRPOT)

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Abstract

Ces dernières années, le problème de tournées de véhicules dynamique (DVRP) et ses variantes, sont de plus en plus étudiés et plusieurs approches de résolution ont été proposées. L'objectif de ce travail est de faire une comparaison entre les résultats de trois différentes approches conçues pour le problème de tournées de véhicules dynamique multi-tour avec overtime (MTDVRPOT). La première approche se base sur une méthode exacte, la deuxième est un système de colonies de fourmis hybride, tandis que la troisième est un algorithme mémétique. Les tests sont effectués sur des instances de petites tailles, et les résultats montrent la supériorité de l'algorithme mémétique.

The Integrated Multi-Plant Production Routing Problem with Simultaneous Delivery and Pickup

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Abstract

The Production Routing Problem (PRP) is concerned with coordinating the production, inventory, distribution, and routing decisions to meet customer demands with an objective to minimize the production, holding and routing costs over a planning horizon.

In this work, we introduce a particular PRP that considers several plants (producers) in the supply chain, which have to distribute their products to a set of customers. Producers are also in charge of collection of used items from customers. Deliveries and pickups must be carried simultaneously, since a customer cannot be visited more than once per period. Each partner (plants and customers) has a storage area composed of both delivery products and returns, as characterized by initial levels, maximum storage capacity and safety stocks.

For a given planning horizon, the desired outputs are twofold. On the production side, the solution should provide a detailed production schedule involving the following decisions for every time period: the production rate in each plant and the amounts of products stored. On the distribution side, tactical decisions regarding plant-to-customer allocation; hence, we determine the amounts of delivered products distributed from each plant to each customer and the assignment of vehicles to routes.

We propose a mixed-integer linear program (MILP) which captures all critical operational and tactical constraints involving a production scheduling and a vehicle routing models. The MILP is developed and tested with CPLEX on small-scale instances.

Dynamic Vehicle Routing Problem with Simultaneous Delivery and Pickup : Formulation and Resolution

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Abstract
In this paper, we studied a fundamental optimization problem encountered by most distribution companies. The Dynamic Vehicle Routing Problem with Simultaneous Delivery and Pickup (DVRPSDP) is an important and special variant of the VRP, in which new customers arrive when the working day has already started, and a number of vehicles have started their tours, in a way that each customer requires simultaneous delivery and pickup. These new customers must be included in the planned tours in real time minimizing the total travel distance.
A rich literature review of the problem is carried out. A mathematical model has been formulated for the DVRPSDP, and it is tested with cplex to provide optimal solutions for small instances. A memetic algorithm has been applied to solve it, the proposed algorithm is a combination of the genetic algorithm with a local search procedure.

Session S2W1 : Uncertain models

Minimax Strategy for Lane Choice Prediction in Markovian Traffic Modeling

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Abstract

Abstract: Road networks are daily overloaded by vehicles. Starting from this worldwide issue, we can see the necessity of finding solutions for travel times improvements. Many solutions can be found if we look to the lowest possible level in traffic modeling. At microscopic level, we can have the best overview about the vehicle's interactions, about their velocity, acceleration or lane change behavior. This paper proposes a new approach of lane choice prediction using an AI (Artificial Intelligence) based gaming strategy. Having a piece of road with the lane change action modeled as Markovian process, for a chosen vehicle, this paper aims to find the better decision considering the desired destination and the involved costs. The lane change action will be described as a game where is involved the vehicle that initiates the action, together with parameters as traffic destination volumes, intermediary traffic volumes associated to distinct lanes and the placement of lanes splitting points. The efficiency of the proposed approach is proved by a comparison with the Dijkstra's algorithm, which is considered optimal for route choice problems solving. The similar results obtained as destination volumes by comparing with the mentioned optimal algorithm were used as validation step in this paper proposal.

Accounting for deficit in ABC-XYZ analysis

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Abstract

This work proposes an ABC-XYZ-type analysis modified with an observed merchandise deficit. The deficit is determined by right censoring. This manuscript proposes to account for right censoring in the ABC-XYZ analysis. This modified ABC-XYZ analysis updates many important quantities: the projected income, the coefficient of variation, and a nonparametric Kaplan-Meier estimate. An illustrative example shows that the classical ABC-XYZ algorithm underestimates the merchandise value where the deficit was observed; the magnitude of the coefficient of variation is also underestimated. The new method mitigates this issue and recalculates the overall profit and the coefficient of variation, taking into account not just the actual observed sample but the estimated overall market demand.

The Use of Uncertain Additional Information in Newsvendor Models

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Abstract

The newsvendor problem is a popular inventory management problem in supply chain management and logistics. Solutions to the newsvendor problem determine optimal inventory levels. This model is typically fully determined by a purchase price, a sale price, and a distribution of random market demand. From a statistical point of view, this problem is often considered as a quantile estimation of a critical fractile which maximizes anticipated profit. The distribution of demand is a random variable and is often estimated on historic data. In an ideal situation, when the probability distribution of the demand is known, one can determine the quantile of a critical fractile minimizing a particular loss function. Since maximum likelihood estimation is asymptotically efficient, under certain regularity assumptions, the maximum likelihood estimators are used for quantile estimation. Then, the Cramer-Rao lower bound determines the lowest possible asymptotic variance. Can one find a quantile estimate with a smaller variance than the Cramer-Rao lower bound? If relevant additional information is available, then the answer is yes. Additional information may be available in different forms. This manuscript considers minimum variance and minimum mean squared error estimation which incorporates additional information for estimating optimal inventory levels. A more precise assessment of optimal inventory levels leads to a higher expected profit

Conception of Twisting Satellite Dispatching System (TSDS)

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Abstract

In the current industrial world, companies are under great pressure from their customers who demand good quality products and services at the lowest possible costs. To do this, it has become a prerequisite to ensure good care of the production assets in order to grant the greatest equipment availability at the best performance while respecting the budget allocated. Due to the lack of flexibility and automation of equipment, enterprises are confronted on using excess quantity of raw materials to recover those lost during the production processes and this becomes a great burden to the companies because they are obliged to fix the price to a high level. Or nowadays, the automotive market is full of great competitiveness and the act of elevating the product price represents a main root cause of the loss of customers and market share to a company. The work presented here, has been carried out in the enterprise COFICAB KENITRA in 2018 to improve the production processes in the metal department whose activities are focused on metal part of the wires manufactured in this company especially in Twisting zone.

Before launching the manufacturing, the enterprise makes budget of the quantity of raw materials to be used while twisting copper strands, but due to the lack of flexibility of the current Twisting machine , the mechanical tension applied to each copper strand during the process is not the same, there is a great variability of the characteristics of the products. Moreover, there is a waste of raw materials due to the friction of copperstrands along some pieces composing the systems. So, it is in this connection, the enterprise undergoes variations between the raw materials used and that should be used and then, the cost of cable manufacturing increases. Finally, to

recover this cost rising, the product price is highly fixed, which is a risk and a threat on the development of this company. The mission of this research was to develop and conceive a twisting system able to minimize the variability of the mechanical tension applied to the copper strands by at least %80 and to minimize the friction of those strands and some system pieces by %100. To arrive on a such mission, we adopted a very effective method to improve the industrial problems, it's about the DMAIC (Define, M: measure, A: analyze, I: improve and C: control).

After implementing the first part of the solution, we were able to attend zero friction of the strands along pebbles and the tension variability has been reduced by %70 in the whole production process. The new system we conceived was named "Satellite Dispatching System" because the motion of cable strands crossing it resembled to the one of a satellite, and finally the project has been called "conception of Twisting Satellite Dispatching System (TSDS)" for automotive cables manufacturing. In the first step, we made preliminary studies of the research using mathematical tools to provide a model of what was our proposition and then we made its design and simulation using CATIA V5.After implementing our solution including the one for the second part, the whole system became %70 more stable, precise, flexible, automatic and its productivity was increased by %6.2. This paper is a summary of practical guide to the innovation and development of the industrial world machines especially ARH630 and D632, built by NIEHOFF and are highly used in wiring companies.

Morphological filters for global optimization*

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Abstract

In this paper we construct an algorithm based on morphological filters, for large scale global optimization, for optimizing functions in big dimensions, we introduce firstly the theory of morphological filters, secondly, we will construct an algorithm based on this theory before implementing it. A panel of various benchmark problems with different properties were used to assess the performance of the proposed Optimization morphological filters (OMF) algorithm. The obtained results has shown the scalability of the algorithm in contrast to optimization algorithms encountered in the literature. Moreover, in comparison with some state-of-the-art metaheuristics (PSO, CuCkoo, Bat...), the computational results revealed that the proposed OMF algorithm is an effective and efficient optimization algorithm

Session S2W2 : Automotive industry

Tactical horizon production planning in the automotive industry

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Abstract

Today, to give the customer a multiple choice of products, the market tends towards diversity and increasing variation of products, as well as the decrease of products' life cycle, since the customers think quickly that the product is not more fashionable. This phenomenon is applied also in the automotive sector. Several luxury options are added, cars are becoming more and more intelligent... the thing that increases the profits and competitiveness of companies.

From a marketing view, the variation of the products is an advantageous opportunity, whereas the complexity resides in the realization and the management of this variation all along the supply chain[1]. This leads us to introduce our subject of the thesis which deals with the issue of the dynamic production planning considering the variation of the products and the impact of these on their quality in the automobile industry[2]. Since this is a very important and critical factor, as any non-compliant product may impact the safety of the end customer (car driver), quality indicators are considered as very important element acting directly on the customer satisfaction. For this reason, the objectives of dynamic production planning must be aligned with those of quality, that is, satisfy the customer›s order on time while delivering a product of desired quality.

The optimal location of the electric vehicle infrastructure utilizing wireless charging in a multipath network, round-trip

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Abstract

There are a number of great benefits to electric vehicles. For this reason, electric vehicles (EVs) have become increasingly popular as a mainstream transportation solution, opportunities to recharge the vehicle away from home have become a critical issue, and it needs a long waiting time. The wireless charging EV is one of emerging transportation systems in which the EV's battery is charged via wireless power transfer technology. Wireless charging EV is a type of EV in which charging is done using wireless power transfer technology, which does not require any physical contact in the process of transferring electric energy. The high cost of this technology requires an optimal location of the infrastructure along the route. For this, the main contribution of this works is to propose the strategic location of inductive power transmitters especially when there are several routes between an origin and a destination, which allows each vehicle to go from the origin to the destination and to return to the origin. Our goal is to find a compromise between the cost of installing the inverters and power segments and the cost of the battery while maintaining the quality of the vehicle routing.

Impact of maintenance 4.0 on the performance of the production function: Application to the automotive industry in Morocco

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Abstract

The current economic context is characterized by an increasingly volatile and unpredictable demand, an ever-increasing variety of products, and managers generally use new organizational and operational methods. To this end, the imperative of business survival depends to a large extent on the development of several alternatives aimed at generating added value. Digital transformation, also known as industry 4.0 or fourth industrial revolution, is transforming the business and bringing radical changes not only to systems and processes, but also to management methods, business models and the workforce. The effects of this transformation will have to be mastered through a global vision, a digital strategy, a redefinition of the business lines, as well as the integration and optimal use of digital tools. This transformation of manufacturers is a real opportunity for the development of the manufacturing sector and economic growth in Morocco.

Our study aims at showing the impact of maintenance 4.0 on the performance of the production function through cost benefits. The first part of the article describes the value of maintenance 4.0 and shows previous research on industry 4.0. Deals with The second one presents our methodology for measuring performance with maintenance 4.0. The third part is the subject of an application of our new methodology to a practical case in the automotive sector. We end with a conclusion and research perspectives.

Session S2W3 : Production and inventory management

Designing efficient material handling systems: a two-stage approach based on DEA cross-efficiency

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Abstract

The process of selecting material handling (MH) models as well as evaluating related MH systems is a milestone for the design of manufacturing and logistics facilities. In order to support managers towards this process, we propose a new methodology, based on data envelopment analysis (DEA), and deploying over two stages. In the first stage, the best MH models are selected on the ground of the MH manufacturer's technical specifications and market prices. In the second stage, alternative MH systems are produced through combinations of best MH models picked in preset numbers, from different category pools, according to a set of criteria. For both stages, we develop a DEA cross-evaluation framework that exploits the voting system embedded under the cross-efficiency matrix and integrates the manager's subjective judgment as an essential component of the decision making process. The proposed procedure is illustrated using a sample of MH equipment collected from catalogues of MH manufacturers and vendors.

Solutions innovantes issues de la préfabrication multiétage en béton et en acier : Une revue de la littérature

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Abstract

Prefabrication is a construction method based on components processing in a factory. This construction method is based on strong industrialisation and robust logistics. This article describes the characteristics of the prefabrication industry for multistorey buildings using steel or concrete as the main material. Based on a literature review, it presents the industry in three ways: value chain, products and processes. By explaining the solutions implemented along these three main axes, the article highlights how this industry stands out from the traditional construction and how it is moving towards efficiency. This article aims to highlight the challenges and complexities of this industry while emphasizing the most innovative solutions to overcome them.

Allocation optimisée de la production par une meilleure coordination interdépartementale : Cas d'études dans le secteur forestier

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Abstract

Dans l'industrie canadienne du bois d'œuvre, on observe souvent une décentralisation de la prise de décision stratégique. Tous les départements administrent leurs opérations afin de maximiser leurs indicateurs de performance respectifs : les unités de sciage tentent de maximiser l'utilisation de leurs équipements et de minimiser les pertes de matière; les unités de finition tentent de maximiser la valeur actuelle nette des produits générés; le transport tente de minimiser ses coûts, alors que les ventes tentent de maximiser le chiffre d'affaires. La problématique est alors de concilier les objectifs, parfois en opposition, des différents départements. Cet article évalue les retombées de la coordination interdépartementale sur la performance globale d'une entreprise forestière canadienne de façon à ce que la production, la logistique et les ventes soient impliqués dans le processus de livrer les bons produits, au bon moment et à moindres coûts. L'effort est concentré sur la coordination entre l'unité de finition, le transport et les ventes. Dans ce contexte, un modèle de programmation linéaire en nombres entiers est développé afin de réduire les coûts en allouant la production projetée et les produits en stock aux commandes réalisées. Un second cas, dans lequel la prise de décision pour l'unité de finition, le transport et les ventes est centralisée de même que le point de pénétration de la commande déplacé, est aussi étudié à l'aide du modèle d'allocation de la production. L'application du modèle pour le cas à l'étude démontre qu'une coordination production-ventes accrue permettrait d'obtenir une réduction des coûts de transport de l'entreprise de %11,7.

Bi-level Multicapacited Facility location Problem

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Abstract

Facility location problems can be considered as a century-old science. Studies on this subject began in the 1950s and are still relevant today. In 2016, a new variant of the location problems, called "budget constraint multi-capacitated location problem" (BMCLP), is published to generalize the p-median one. In this work, we proposed a generalization of the BMCLP into a bi-level location problem (plants-depots and depots-customers) in order to take into account the modern supply chain constraints. We therefore established a mathematical formulation for the new problem, named "bi-level multi-capacitated facility location problem" and we created data instances adapted to this new formulation based on semi-random factors and certain generation methods available in the literature. In order to validate the latter formulation, we proposed Branch & Cut solving method used by CPLEX. Finally, we presented the obtained computational results, which prove the efficiency of the new formulation for the tested instances.

Session S1T1 : Metaheuristics

Genetic algorithm on GPU for the robust uncapacitated single allocation p-hub median problem with discrete scenarios

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Abstract

Hub location problems (HLPs) are network design issues that are solved as part of a strategic decision-making process. In recent years, the HLP has been expanded to handle uncertain data, giving rise to the Robust HLP (RHLP). In the RHLP with discrete scenarios, the unique set of requests in the HLP is replaced by a set of discrete scenarios (a scenariocan be the demand observed between nodes at given periods of the year). In a robust optimization approach, making appropriate decisions for all scenarios can be time-consuming, especially with the availability of HLP instances that persist on hundreds of nodes, they become difficult to resolve in a reasonable amount of time using computers conventional. The the aim of this paper is to show that such problems can be solved in reasonable time with high quality approximate solutions, using the computing power of the GPU graphics card. We present a GPU-based approach to solve large size instances of the RHLP. The proposed approach solves all senario (in parallel) using a genetic algorithm and gets the robust solution according to the min-max lexicographic principle; the worst cost on all scenarios being minimized in parallel. We evaluated its effectiveness on large size instances up to 4000 nodes on a GPU Quadro Pro P24) 6000GB and 3840 cores).

Kriging-Based Multi-objective Infill Criterion using NSGA-III for Expensive Black-Box Functions

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Abstract

Within the context of Kriging model-based optimization, an efficient way called infill sampling criteria is used to select better additional sampling points to refine the Kriging model and gradually predict the optimum value at each iteration.

Most of them either use one criterion or combine various criteria into one numerical formula. However, this idea does not simultaneously ensure the local exploitation of the model and the exploration of the search space. In this paper, we propose an optimization approach based on Kriging surrogate model and a multi-objective infill sampling (MIS) strategy that considers simultaneously the predicted mean (local exploitation) and the approximation uncertainty (global exploration) as two conflicting criteria. Internally, an evolutionary algorithm using reference point-based non-dominated sorting algorithm (NSGAIII) is used to optimize this criterion. Also, an algorithm based on fuzzy set theory is used to extract the best solution from the Pareto front. Numerical experimentations are performed on a large set of analytical benchmark to highlight the robustness and efficiency of the presented strategy.

Genetic algorithm-based heuristic for flexible cash collection scheduling to optimize working capital

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Abstract

The financial supply chain involves the flow of cash throughout the physical network. These financial flows are still performing as they did in the past thirty years. The management of the flow of money is complex since the delivery or receipt of a product or service does not necessarily give rise to an immediate collection or disbursement of money. This delay of synchronization impacts significantly the working capital and forces the companies to look for nearly the same visibility in their financial flows as in their physical ones. Different supply chain strategies can be used to improve the working capital. Companies can either manage their inventory more efficiently or reduce the Days Sales Outstanding (DSO) and payment terms from customers or Increase Days Payable Outstanding (DPO) by paying suppliers on later terms. We address in this the paper the problem of scheduling invoice payments in order to improve working capital performances. We model the problem using a GA and develop a metaheuristic to solve it conduct experiment analysis

Mining Tourism as An Orienteering Problem: A Real-World Data Case

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Abstract

Visiting mines has become the focus of attention for many countries which actually called Mining Tourism. In this paper, the objective is to give an example of a tourist route of real data of Moroccan mine sites. This route crosses several Moroccan regions that have an interesting mines number. We indicate how mining tourism can be modeled as an orienteering problem. We propose combinatorial optimization solving approaches to solve this problem by using the genetic algorithm, and the Ilog Cplex Optimization Solver.

Session S1T2 : Smart Process Management in Transport and Logistics

An integrated rough-DEMATEL method for sustainability risk assessment in agro-food supply chain

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Abstract

In the recent years, sustainability has becoming an important topic in agro-food supply chain. Moreover, these supply chains are more vulnerable due to different risks from man-made and natural disasters. These risks are interrelated in practice. However, there is a little knowledge in assessing sustainability risks by considering interrelation between them. To this end, this paper presents an integrated rough-DEMATEL method to assess the sustainability related risks in agro-food supply chain. The literature was reviewed and the main risks are identified. The methodology is implemented in a real case company in order to evaluate its applicability and performance. The detailed implications and main limitations are presented as conclusions remarks.

Dynamic dimensioning of logistic resources : Case of stocks

Moroccan multinational company

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Abstract

This paper deals with the problematic of dynamic stocks in automotive industry .Considering the fluctuations of demand within the hard constraints of management (firm, forecast, transit time, Incoterm, batch size…) from the procurement up to the delivery. This work will present a helping decision making tool to define the minimum and maximum, nominal stock of each reference in the warehouse considering the constraints of management, adding also the decisions of top management. In addition to the alerts of stock, the tool developed will allow the managers to specify the needed surface for each reference in the warehouse.

Technology Assessment for Designing Smart Logistics Zones

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Abstract

This paper describes an approach how production and logistics can meet the challenge of a new industrial ecosystem through the intelligent networking and digitization of participating resources of the value creation process. Intelligent networking in the sense of an Industrie 4.0 and thus the abolition of rigid, physical system boundaries is postulated by the research approach of the «Smart Logistics Zone». This is defined as a scalable area of investigation and action for the analysis, evaluation, planning, control, regulation and (re-) configuration of logistics solutions [1]. It encompasses the interaction of logistical objects, processes, systems and the infrastructure involved according to demand and situation. The approach implies an interactive design of the future of human-technology organization. The procedure of the Smart Logistics Zone should support entrepreneurial decision processes purposefully and on the core idea of an Industrie 4.0 and/or Logistics 4.0 in preliminary way. In addition to the general research concept, this paper focuses on the application of the methodological approach to a reference scenario of the Smart Logistics Zone.

Assessment of road transport in Morocco in energetic terms using the DMAIC approach

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Abstract

The objective of this study is to analyze the situation of road transport in Morocco from the point of view of energy use. In this respect, the use of an approach that can solve some problems, such as the DMAIC approach for identifying the different sources of inefficiency and proposing recommendations to reduce them, was discussed. This approach is structured around five phases: define, measure, analyze, innovate and control. To ensure the effective use of this approach, there are many quality assessment tools such as the WWWWHW method, the Fishbone diagram, etc.

Session S2T1 : Sustainable and reverse logistics

Production modeling towards sustainable hyperconnected logistics

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Abstract

Physical Internet is a new system that aims to improve global logistics to be sustainable and efficient economically, environmentally and socially. it is based on the interconnection of logistics networks by a standardized set of means and standards. Therefore, it generates an intense wave of innovative changes in all nodes of the supply chain.

This paper deals with the impact of the Physical Internet on the way of realizing products. It addresses the issue of product realization using a hyperconnected mobile production mode, based on the dynamic deployment of production modules and resources sharing. Besides, a make-to-order optimization model for that kind of business is developed, and directions for future research are provided.

Maintenance logistics management: a new Lean/REX model to activate the human potential

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Abstract

Maintenance logistics is a generic approach to manage maintenance activities and its resources. Even though this new framework remains promising, its managerial aspect is still in need to focus more on the practical perspective. In this paper, we present a literature review of main maintenance management models based on maintenance policies/ strategies discussion to conclude the necessity to build a new sustainable model activating the human factor potential. Therefore we propose a Lean/REX model leading to a new practical standards conception inspired by the lean culture and experience feedback to seek new improvement opportunities in maintenance logistics.

Optimization of green reverse logistics network Integrating artificial bee colony Algorithm and multi-agent system: case of medical waste

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Abstract

Green supply chain refers to a closed-loop logistics network, including reverse logistics and regular supply chain ,and with the Growing of environmental concerns , the decision makers was enforced to design their supply chains considering environmental impacts as well as economic objectives, Nowadays the medical waste management become one of the important issues that attracts scientists , because of the potential environmental risks that can be generated by the mishandled of the medical waste .The proposed model aims to optimize: (i) the total cost of the network including, collecting, processing, recycling of medical waste and transportation between each level (ii) the environmental emissions generated by the whole system ,using artificial bee colony Algorithm hybrid multi-agent system

Performance Assessment of Sustainable Procurement based on ISO 20400 Standard

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Abstract

Sustainable procurement (SP) is an area that is given increasing attention within the academic community nowadays. The current article is concerned with a statistical approach involving latent and manifest variables applied in order to assess the organization›s sustainable procurement performance (SPP). The main idea is to develop an assessment tool and a measurement of the SPP, enabling the company to characterize her performance regarding to the ISO 20400 standard›s seven core subjects. For this, we conceptualize a structural equation modeling (SEM) which describes various causal connections between the sustainable procurement's components. The SEM's resolution is based on the Partial Least squares (PLS) method and the implementation is running in the XLSTAT software.

Heuristic Based Strategy for Multi-Components Products Recovery and Remanufacturing

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Abstract

Many manufacturers are currently making efforts to adopt the remanufacturing options in order to take advantage of its environmental and economic benefits. In this paper, we study an optimisation problem arising from the main steps defining the remanufacturing process. Over a time horizon divided into non-homogeneous predetermined periods, we aim to select, among a set of identical items in use, the items to be recovered and remanufactured to the best grade (equivalent to new product grade). The proposed approach is based on products and components performance evolution and the frequency of usage of customers. A mathematical formulation of the problem is proposed, with the objective to minimize the total cost and the total carbon footprint related to recovery (transportation), storage, remanufacturing and usage. We proposed a constructive heuristic based solution approach to find a feasible solution to the considered problem.

Session S2T2 : Distribution

An AHP Based Approach for Multi-echelon Inventory System Selection: Case of Distribution Systems

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Abstract

Nowadays, inventory management is becoming more difficult as supply chains are complex and involve many facilities for different stages. The multi-echelon inventory management permits to the supply chains to be more competitive by an efficient control of inventories and a high responsiveness of the whole system. As there is no single exact inventory management policy, and there is a multitude of multi-level inventory models, the selection of the most suitable alternative is not easy. There's few previous research done concerning the selection phase of a multi echelon inventory system in our knowledge. In this paper , we try to contribute in the literature by using the Analytic Hierarchy Process (AHP), a multi-criteria decision making method (MCDM), that helps a Decision Maker (DM) to choose and select the appropriate multi-echelon inventory system. We focus in this research work on the case of distribution inventory systems. We apply this framework to the Moroccan public pharmaceutical supply chain.

Selective and dynamic distribution Petrol Secondary Distribution

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Abstract

Fuel is considered as the energy driver of the economy. It has great influence directly or indirectly in all economic sectors. It is used intensively in every sector, therefore its price are largely unpredictable, so Petrol Secondary Distribution companies try to minimize their stocks levels and work in tight flow. Against this increased demand and limited stocks, distributors have to avoid stock outs for their customers using their limited fleet of compartmented trucks.

In all the papers that we have been able to see and study in literature in relation to this topic, the customer's order is an untouchable given data of the problem, it is thus fixed and the program should find an optimal solution taking into account this data. In our paper we introduce and model a new problem, more interactive, indeed we give our program the ability to act on the customer›s order, so the order become a variable to be determined according to the available stocks and some others criterias, the objective is therefore to determine the optimal set of customers to serve, the quantities to be delivered for each client, the vehicles to be used and the routes to be carried out, respecting all the safety and capacity constraints, so as to avoid any shortage and thereby maximize the customer satisfaction rate and the quality of the company services.

A Decision Support System for Logistics Performance Evaluation of Courier Company

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Abstract

Logistics is one of the major driver of supply chain (SC) and its performance has significant impact on overall SC performance. Due to advancement in technology, collecting, storing, and analysis of data is now become easy. Nowadays organizations are competing each other of the basis of their logistics performance. The purpose of this paper is to propose a prototype of decision support system based on Fuzzy – AHP (FAHP) that incorporate decision makers and managers' knowledge and experience and evaluate overall logistics performance. Initial results show that transit time indicator (%51.0) is the highest ranked main function.

Perishable food distribution in urban area based on real-road network graph

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Abstract

Since their introduction, Vehicle Routing Problems (VRPs) have drawn attention of many researchers. Several variants of VRPs have been introduced for numerous applications. Most approaches found in the literature address VRPs on a customer-based graph, considering that each pair of point of interest (customers, depots, etc.), is linked by a single best path computed based on one criterion which is generally the distance. However, in real life applications, several attributes are defined on each road segment, hence alternative paths should be considered. In this study we propose a mathematical formulation to address the Capacitated Vehicle Routing Problem with Time Windows and multiple Paths denoted by CVRPTW-P for the distribution of perishable food in urban area. To handle the issue aforementioned, we adopt the real road network modeling approach considering alternative paths to find efficient routes based on real spatial data instead of mathematical equations which is commonly used in the literature. Computational experiment was conducted using CPLEX solver for random instances. Results prove that exact resolutions fail to solve large scale instances due to model complexity.

Collection and transport of waste types by compartmentalised vehicles

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Abstract

In this paper, we discuss a multi-compartment vehicle routing problem that occurs in the context of solid waste collection. Typically, in a city, different sources of waste are dispersed in a heterogeneous way, which increases the cost of collecting and transporting waste. In the waste management system, n numbers of sources are available in different municipalities of a city; each source generates different types of waste. The proposed system divides the entire integrated waste management system into three different parts. firstly transfer separated solid waste from different sources (households, markets, offices, etc.) to the compartmentalized transfer station, each compartment accommodating one or more supplies of the same type of product; then transport the solid waste separated from the transfer station to the treatment plants, each plant belonging to a specific specialty via a compartmentalised fleet; and finally transfer the waste produced from the treatment plants to the nearest landfill. our objective is to optimize the total cost of collecting and transporting different types of waste

Session S1F1 : Global Supply Chain

Environmental impact assessment in the case of pooling Moroccan hydrocarbon supply chain resources

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Abstract

The logistic resources pooling concept has become a subject of several researches in previous years, in various activity sectors (transport, warehouse, E-commerce, etc.) in order to improve logistics chains performance in sustainable development context. The pooling resources (warehouses, transports, platforms, etc.) hydrocarbons supply chain purposes remains few discussed subject in research papers, due to data confidentiality and sector sensitivity.

In this paper the «transport and storage pooling» concepts will be described, as well as a review of the literature about new organization strategies for sustainable logistics. We present the current supply chain petroleum products model in Morocco (diesel gasoil and gasoline products case), and the simulation before and after resources pooling (using ARENA software) to determine CO2 emissions variation rate for an assessment of the environmental impact of the proposed resources pooling.

Composite indicators for assessing the public pharmaceutical products supply chain in Morocco

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Abstract

Composite indicators are frequently used for performance assessment in different fields. They are constructed by combining several components into a single index for describing a multi-dimensional issue. In this paper, we propose a mathematical programming approach to constructing composite indicators from a set of sub-indicators with mixture of precise and interval data. The proposed approach is an extended version of the conventional Zhou et al. (2007a,b) methodology for metrics aggregation initially developed for ratio data to mixed data. The outcome of this study will allow the supply chain managers construct composite indicators to characterize several features of their supply chains. We apply the proposed approach to develop composite indicators for modelling the public pharmaceutical products supply chain in Morocco.

Logistics Service Providers in Morocco: A Study of the offer's suitability for local demand

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Abstract

The main objective of this paper is to study the adequacy of the offer of the logistic service providers with the needs anticipated by the different national economic sectors. This study will allow us to appreciate the maturity of the PSL operating in Morocco, through the level of diversification of their logistics services offerings and thus the extent of their responsiveness. Nowadays the expansion in terms of service has become crucial for any implementation of a successful outsourcing strategy and to attract and convince contractors through efficient and well-adapted services. This paper is structured mainly around three parts: the first part presenting the state of the art in the outsourcing of logistics activities in Morocco. The second part is a presentation of the Moroccan economy through the different national economic sectors. The third part concerns an exploratory study grouping, on the one hand, the various Moroccan sectors and their needs in terms of logistics services, and on the other hand, the offers of a group of LSP operating in Morocco through several services they offer. This study will allow knowing the maturity of the market of the LSP operating in Morocco and its homogeneity with the existing sectors in the country.

Performance Supply Chain et Santé Sécurité au Travail : La prévention des risques professionnels dans les métiers de la logistique

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Abstract

Les évolutions récentes dans le fonctionnement des chaînes logistiques en flux tendus, la recherche de productivité par la mise en place des démarches d'amélioration continue et les exigences de flexibilité pour faire face aux aléas de la demande exercent un impact direct sur le niveau de stress des salariés et sur la santé psychique et physique au travail.

Cet article souhaite, donc, s'interroger sur les effets des exigences de performance logistique sur les conditions de travail des salariés. L'objectif étant d'éclaircir les différents points de vue théoriques sur la question de la santé sécurité au travail en contexte logistique. Il tente, également, d'identifier les sources de stress dans les métiers du transport et de la logistique et mesurer leurs impacts sur la santé des salariés.

A fuzzy TOPSIS based approach for alignment of information technology strategy in supply chain

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Abstract

Information Technology (IT) is a game changer for all enterprises and sectors. Supply chain (SC) is no exception and IT has the potential to make the SC more agile, more responsive and cost effective. The implementation an Enterprise Resource Planning (ERP) system or any Information System (IS) in general, must be included within the enterprise strategy in order to have the optimal output. That's why aligning IT strategy to SC strategy is crucial to achieve the overall value of the SC. Few research are done about how to link these two strategies. The paper aims to contribute to the literature and propose a Fuzzy TOPSIS based approach to align both SC and IT strategic objectives. These objectives come from COBIT (Control Objectives for Information and Related Technology) and SCOR (Supply Chain Operations Reference), which are standards, respectively, in the SC and IT domains. The proposed approach is illustrated by aligning the IT strategy for a pharmaceutical supply chain.

Session S1F2 : Synchromodality Transport Systems

TOWARDS A SYNCHRONIZATION APPROACH FOR CONTAINER PROCESSING WITH DRAYAGE OPERATIONS IN RAIL-ROAD TERMINALS

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Abstract

Recently, seaports have paid much attention to container transportation by rail to evacuate huge container flow received by sea. For this reason, more rail-road terminals are expected in upcoming years near urban regions in order to restrict the intensive use of roads and then achieve a better massification share of hinterland transportation. Indeed, containers are moved between seaports and inland terminals by trains whereas the last/first road mile to urban region is done by trucks. Thus, two main problems arise, firstly containers' drayage by trucks and secondly handling operations management. This paper tries to give better answers to these problems by coupling an optimization model that combines a set of known and new constraints to determine the daily scheduling of trucks and a simulation model for container processing management, internal equipment scheduling and resource allocation. The paper introduces also the containers› availability times as a new concept to synchronize containers' drayage by trucks and container processing within terminals. Finally, we evaluate different operating scenarios under the proposed solving approach based on real data sets.

A Heuristic Approach For Solving Container-on-Barge Stowage Planning Problem Based On Bin-Packing First-Fit Algorithm

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Abstract

In this work, we address the three-dimensional container stowage planning problem of inland vessels called barges. This problem consists in finding the most suitable location of each container in the barge in order to facilitate its retrieval in the chronology of ports to be visited, while satisfying the context-dependent structural and operational constraints related both to the barge and to containers. The main objective is to minimize the total number of unproductive loading/unloading movements, called "shiftings" while ensuring the longitudinal, transversal and vertical stability of the barge. This problem is treated on the basis of its relation with the bin-packing problem. Within this context, we propose a novel heuristic approach for solving container-on-barge stowage planning problem based on the First-Fit algorithm which is considered as one of the most basic bin-packing resolution methods.

New Approach for solving the Internal Truck containers transfert Problem

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Abstract

International maritime transport has becoming an important and interesting way comparing to the land and the rail transport. This improvement have mainly reduced the travel time and the expected delivery time, except sometimes in difficult weather conditions where actual times may be slightly longer than expected. Containers terminals are considered as an interface between different maritime actors: ship owner, freight forwarder, consignee, containers terminal and port authority.

In this paper, we focus our work on a part of the marine transportation, which is the transfer of containers by internal trucks inside a containers terminal. We solve this problem by proposing a new mathematical model and new resolution methods, the obtained results prove the effectiveness of the proposed approach, which help to improve the port efficiency.

Traceability and Risk Management in Container Transport: A Small - Scale Review of methods and technologies

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Abstract

Increasing flexibility and responsiveness are the opportunities smart logistics offers to companies. With the development of the supply chain network (SCN) and big data processing, a simple view at above two technologies separately has become unadvisable. This work deals with the traceability and supply chain risk management of containers during shipping expeditions using real-time Data. The main objective of this article is to make a state of the art of proposed solutions to improve the efficiency of the supply chain by acting on risk management in containers transport. A future approach to improve the real-time management of shipments by taking into account random events is mentioned.

Session S2F1 : Economic models

Agile workforce capabilities in Moroccan companies:

Criteria and practices

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Abstract

One of the most important issues in the 21st century was the unpredictable, dynamic and ever-changing environment. In this context, companies, in general and those dedicated to manufacturing in particular, struggle to obtain a sustainable competitive advantage, or even to ensure their survival, which has created and introduced one of the last organizational concepts: agility.

By putting the environment and the social issues at the heart of its concerns, the agile organization needs to reinforce these investments by developing the fundamental capabilities of the workforce in order to adapt in an agile way to the different changes in the environment. Thus, workforce agility was considered as a second positive response to environmental uncertainty.

This research explores companies› perceptions of the workforce agility in order to clarify this construct. To do this, we focus on the five foundational currents of workforce agility, namely: intelligence, competencies, collaboration, culture and information systems. Thus, in a qualitative approach, we seek to study the five agile capacities by exploring their content, in particular the practices related to these capabilities. As a result of this analysis, we will perform a classification in order to study companies' groupings.

Une gestion dynamique du système de stationnement urbain : ses atouts et ses freins conformément au modèle économique Canvas

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Abstract

Un dimensionnement suffisant des aires de livraison combiné avec leur disponibilité effective facilite la tâche des livreurs, fluidifie la circulation urbaine et améliore la qualité de vie en ville. Il est pourtant à noter qu'il n'existe toujours pas d'outil formel associé à une approche globale pour la conception et la gestion d'un réseau d'aires de livraison. Nous proposons d'étudier l'intérêt d'un système intelligent de stationnement urbain ayant la capacité de modifier, en temps réel, le statut des places de parking d'une aire de livraison à un emplacement ordinaire et inversement. Sa mission principale est de partager, équitablement entre les différents utilisateurs de la voirie, l'ensemble des infrastructures de stationnement. Dans cet article, nous nous concentrons sur l'analyse de la pérennité économique de notre solution à travers un outil simpliste de type Canvas dont la structure constitutionnelle permet d'illustrer la valeur du dit système aux yeux du client. Nous explicitons les multiples avantages en nature et/ou en espèces créés par notre proposition en faveur des différentes parties prenantes.

Airport check-in process: proposal of a methodological framework for a generic model

A case study of the Mohammed V International Airport of Casablanca

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Abstract

Check-in is one of the most important formalities of the flow of airport passengers. This is the first formality of the trip and one of the points of the airport that suffer the most congestion. As a result, it represents a concern for all airport managers pushing them to develop this link continuously. This article aims to give a model to this sub-process to better understand it through a generic knowledge model. It will be applied to terminal 2 of MIAC, the Mohammed V International airport of Casablanca. The originality of this work lies in its use, for the first time in the airport field, of the ASDI methodological framework, commonly used in hospital logistics. This results in a dynamic and static modeling of the check-in subsystem and its decomposition into 3 subsystems (logical, physical and decision-making). The resulting model can be generalized and reused on other terminals ; or even other international airports.

A new car-following model considering the effect of complex driving behaviour

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Abstract

This paper proposes a new car-following model by taking into account the effects of driver anticipation and short-term driving of the preceding vehicle. Driver memory is presented as one of the factors influencing driver anticipation behaviour. Then, the linear stability condition of the proposed model is gained by applying the linear stability theory. By numerical simulation, the evolution of small perturbation is studied. The results show that the stability of the vehicle system can be effectively improved by the effect of a short driving memory and driver anticipation. The process of starting and changing vehicles passing through the signalized intersection is also studied. All the results show that the proposed model has greater stability compared to the FVDM model and other existing car-following models

On-Demand Transport for Persons with Disabilities in France

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Abstract

The aim of this article is to present On-Demand transport services provided for persons with disabilities in France. The results presented in this article could help to know the services developed according to the need of handicaps and propose a roadmap toward new services in order to facilitate their integration into the society and their access to the cities infrastructure.

Session S2F2 : Physical Internet

Internet Physique : un paradigme déclencheur des systèmes de transport mixte en ville

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Abstract

L'appropriation des plans de déplacement urbain qui traitent séparément la mobilité des passagers et des marchandises réduit énormément la durabilité et l'utilisation rationnelle des ressources. Ces phénomènes sont encore amplifiés dans les villes assez peu dotées en matière d'infrastructures logistiques mais qui connaissent pourtant une explosion du nombre de commerces de proximité nécessitant des livraisons. Les schémas intégrateurs, d'un point de vue des flux pourraient combler cet écart, cependant ils reposent sur une mutualisation à grande échelle. Ce papier a pour objectif de présenter comment le concept d'Internet Physique peut aider à cette mutualisation en supportant les alternatives de mixité voyageurs/fret au niveau des agglomérations urbaines.

Studying the Rerouting of Empty Carriers during their Return Trips to Manage Rare Mobile Resources in a Physical Internet

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Abstract

To manage the unbalance between the needs in expensive containers (such as refrigerated containers or 'reefers') in some places, and the fact that the available empty containers of this kind are in another place, it is necessary to move these empty containers efficiently between places. In this paper, we use the empty carriers during their return trips after a delivery, to move the empty containers from the locations where they are, to the locations were they are needed. First, we use a method based on the Stepping Stone algorithm to compute a minimal cost list of moves in the associated transportation problem. Second, we use a heuristic to choose carriers during their return trips, and compute low cost possible path deviations that needed to accomplish these moves. A numerical example is presented at the end.

Efficient Simulated Annealing Algorithm for Wireless Sensors Location in Logistics 4.0

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Abstract

In the context of fourth industrial revolution, technological innovation has become a necessity asset to production systems and scheduling, thus creating a direct influence on the concept of Logistics, best given examples are the development and the widespread integration of information and communication technologies in applications over the last ten years such transport management systems, warehouse management systems and much more.

Industry 4.0 is a well spread research topic both in academia and industrial areas, the concept afflicts meaningful changes and modifications to known up to day traditional concept of Logistics by adopting Industry 4.0 key technologies such as wireless information transmission, big data and Internet of Things.