BOOK OF ABSTRACTS

GIN 2022

THE GREENING OF INDUSTRY NETWORKS CONFERENCE ON LOGISTICS, NEW TECHNOLOGIES & EFFECTIVE CIRCULAR ECONOMY

PREFACE

Welcome from the Greening of Industry Network (GIN)

The Greening of Industry Network is in entering its fourth decade of bringing together some of the world's leading thinkers from academia, industry, government, and civil society. This is the first time we are holding a sponsored conference in upper France. This region is central to much of Europe's and the world's economy. We also know that given the developed state of the region its impact on climate change, environmental emissions, and material usage all contribute to environmental burdens that we must manage.

But, this region, as in every region of the world, has the knowledge and skills to be able to address these complex, "wicked problem", issues. This conference on Circular economy, transportation, logistics, technology, and sustainable supply chains brings together individuals from many regions to discuss and address these complex systemic concerns.

We especially appreciate the need to bring together disciplines as engineering, policy, business, and environmental disciplines—to name a few—join together to address the many concerns. We expect a dialogue and hopefully some action from various disciplines and vocations. Sustainability science (of which the circular economy) requires a transdisciplinary focus. Where use-driven science meets social systems, and eventual implementation of solutions.

We will not have all the solutions; but through our linkage to past and future investigations from GIN and other sources, a broader picture is expected to emerge. GIN has touched upon and contributed on many of the topics, such as in 2008 we actually had a Transportation themed conference, in 2015 we had a Circular Economy themed conference, sustainable supply chains and logistics appeared in proceedings going back to the early years of GIN. Thus, we are happy to bring to together the latest thoughts as new technologies to support these topics emerges.

It is our pleasure to be sponsors of this Conference held in Cambrai and Valenciennces with co-sponsorship of the Université Polytechnique Hauts-de-France (UPHF) and the LAMIH Laboratory. We wish to thank UPHF in hosting this important event and the TEC-LOGd Chair de Excellence, also sponsored by the city of Cambrai. There are many people to thank for making this conference a reality with dozens of individuals necessary to make up the Advisory, Steering, Organizing, and Scientific Committees.

We look forward to a stimulating and energetic conference.

-Greening of Industry Network (GIN) Coordinators

PROGRAM

July 6th, 2022

TIME	TYPE	EVENT
11:30 - 12:00	Logistics	Registration - Registration
12:00 - 13:00	**Break**	**Lunch**
13:00 - 13:30	Speech	Opening Ceremony
13:30 - 14:00	Speech	Plenary talk : Hauts-de-France Cases studies in Circular economy - Carole Magniez
14:00 - 14:30	Speech	Plenary talk : "Delivering on Circularity – DHL's approaches for a green supply chain" - Florian Schwarz
14:30 - 14:45	**Break**	**Coffee break**
14:45 - 16:45	Session	New technologies (IoT, blockchain, drones, autonomous vehicles etc.) in service of Circular Economy
14:45 - 16:45	Session	Circular Economy Strategies
14:45 - 16:45	Session	Logistics 4.0 through Circular Economy principles in the era of IoT
16:45 - 17:00	**Break**	**Coffee break**
17:00 - 19:00	Session	Transport
17:00 - 19:00	Session	Identifying and Overcoming Circular Economy Challenges
17:00 - 19:00	Session	Waste management

July 7th, 2022

TIME	TYPE	EVENT
08:00 - 12:00	Tour	Industrial Visits - Industrial Visits
12:00 - 13:30	**Break**	**Lunch**
13:30 - 17:30	Round Tables	**1) Circular economy and sustainability in the social-economic world:** • Why a company would be involved/ interested in the activities that promote Circular Economy and Sustainability? • How do you envision the role of government in this process? • How do you envision the role of the academia? **2) Supply chain and Circular Economy for the sustainability:** • How do you see the role of the sustainability and sustainable supply chain? • How do you see the role of logistic in the circular economy?

TIME	TYPE	EVENT

- Which resources do you need and which obstacles you face for successful circular economy aspects?
- How do you see the evolution of circular economy?
- In your opinion what is the importance of the following five dimensions in greening and circular economy: 1. Rentability; 2. Generation of incomes; 3. Continuity of activities / resilience; 4. License / right of exploitation; 5. Image and reputation

3) New technologies and Circular Economy: Drones, Artificial Intelligence, Robotic, Big Data…
- Which technologies have you already applied /or plan to apply?
- Is there some connection between those technologies and circular economy?
- Which technological solutions could be helpful in technological transitions?

4) Creating confidence in circular economy and eco-system: Blockchain, Cybersecurity …
- Which technologies have you already applied /or plan to apply to secure your systems?
- How can we enable confidence in the logistic networks?
- What is the role of this confidence in the sustainability and ecologic transitions? And role of circular economy?

TIME	TYPE	EVENT
17:30 - 18:30	Logistics	Free activities
18:30 - 20:00	**Break**	**Cocktail time**

July 8th, 2022

TIME	TYPE	EVENT
09:00 - 09:30	Speech	Plenary talk : The three "worlds" of circularity - Walter R. Stahel
09:30 - 10:00	Speech	Plenary talk : Optimizing the circular economy - Prof. Dr. Kannan Govindan
10:00 - 10:15	**Break**	**Coffee break**
10:15 - 12:15	Session	Industrial Symbiosis, Industrial Ecology, and Sustainable Supply Chain linkages
10:15 - 12:15	Session	Circular Economy via relevant Logistics with the help of new technologies
10:15 - 12:15	Session	New Circular Economy Business Models
10:15 - 12:15	Session	Analytical possibilities and solutions for the Circular Economy
12:15 - 12:30	Speech	Plenary talk : Linking the Future of the Circular Economy and GIN - Prof. Dr. Joseph Sarkis
12:30 - 12:45	Speech	Closing session - Prof. Dr. Diego Vazquez-Brust
12:45 - 15:00	**Break**	**Lunch Barbecue**

Program details on: https://gin2022.sciencesconf.org/program/details

Speakers biography on: https://www.uphf.fr/evenements/gin2022/keynote-speakers

KEYNOTE SPEAKERS

Walter R. Stahel,

Title: the three "worlds" of circularity

Short description: bio-cycles of Nature's, tech-material cycles of the manufactured world, invisible quality cycles of the immaterial world. Circular society of scarcity, circular industrial economy (from 3000 BC to 2020)

Short BIO

founder-director of the Product-Life Institute (Geneva, 1983), the oldest consultancy in Europe devoted to developing sustainable strategies and policies.

MA in architecture from ETH Zurich (1971). Visiting Professor, Faculty of Engineering and Physical Sciences, University of Surrey; full member of the Club of Rome; former member of the Coordination Group of the European Circular Economy Stakeholder Platform of the European Parliament; member of the Scientific Advisory Board of Institute CRETUS, Universidade de Santiago de Compostela, and the Scientific Foresight Board of CircularEconomyAlliance.

Promoting the opportunities of a circular industrial economy, and of a performance economy selling goods and molecules as a service.

Honours: degrees of Doctor honoris causa, University of Surrey (2013) and l'Université de Montréal (2016). Mitchell Prize in Houston, TX (1982, 'The Product-Life Factor'); first prize in the German Future's Society's competition (1978, 'unemployment, occupation and profession').

Corner books: 'Jobs for Tomorrow, the Potential for substituting manpower for energy' (1976/1981), Vantage Press N.Y.,: 'The Performance Economy' (2010), Palgrave MacMillan; The Circular Economy – a user's guide (2019), Routledge.

Contact: wrstahel2014@gmail.com

KEYNOTE SPEAKERS

Florian Schwarz

Title : "Delivering on Circularity – DHL's approaches for a green supply chain"

Short BIO

Florian Schwarz, Head of Sustainability

DHL Customer Solutions & Innovation

As Head of Sustainability in DHL Customer Solutions & Innovation (CSI), Florian Schwarz is responsible to drive the Sustainability agenda for and with the top 100 customers across the Deutsche Post DHL divisions. This includes achieving a carbon footprint reduction through the GoGreen product portfolio of clean fuel & technology, supply-chain optimization, and circularity solutions. It also means educating DHL's sales organization on sustainability and demonstrating thought leadership inside and outside of the organization.

In his previous role in DHL CSI, Florian was responsible for the Program Office and the Coronavirus Customer Taskforce. Before that, with DHL Global Forwarding, Florian created and lead the After-Sales Organization which took customer reporting and issue resolution to a new level, building on his extended experience as Lean Six-Sigma Blackbelt and Head of Strategy France. Florian holds a Master's degree in Business Administration and lived and worked in different countries in Europe and Americas.

https://www.linkedin.com/in/schwarzflorian/

KEYNOTE SPEAKERS

Prof. Dr. Kannan Govindan., M.E., PhD.,

Title : Optimizing the circular economy

Short BIO

Dr. KANNAN GOVINDAN

DIAS - Chair of Engineering,

Chair Professor of Operations & Supply Chain Management,

Head, Centre for Sustainable Supply Chain Engineering,

Department of Technology and Innovation, University of Southern Denmark,

Odense, DENMARK.

Kannan's research is primarily in sustainable operations, logistics, technology, and supply chains. For more than ten years, he has worked with the construction of global logistics and supply chain networks. His research is based on the development of decision-making models and toolkits for sustainable and intelligent manufacturing. His interest in sustainability drives him as a researcher to become a global leader/researcher in the area of sustainable operations. In the future, he would like to explore the potential opportunities of global sustainability with the focus of supply chain partners contributing to the sustainability and towards achieving the circular loop. Another global issues that will be threatening to the supply chain will be migration, sharing resources, resilient supply chains, reuse of (raw) materials, green, environmentally friendly production which he will also focus in next few years.

DR. Carole MAGNIEZ

Director at **Team2** competitiveness cluster on CE

Title : Haut-de-France Cases studies in Circular economy

Short BIO

Carole Magniez is a chemical engineer, a graduate of HEI. Holder of a doctorate in the development of synthetic textile materials with improved flame resistance properties, Carole Magniez became interested in the development and management of national and European collaborative research projects (coordinator of NEREFITEFP5, FLEXIFUNBARFP6, MAPICC3DFP7). Carole Magniez has more than 20 years of experience in the service of innovation and collaborative research. Whether on a regional, national or European scale, she has expertise in innovation partnership strategy, construction and coordination of large-scale projects.

Professor Joseph Sarkis

Title: Linking the Future of the Circular Economy and GIN

Short BIO

Joseph Sarkis is a Professor of Management within the Business School at Worcester Polytechnic Institute (WPI). He earned his Ph.D. from the University of Buffalo. His research and teaching interests include Environmental Sustainability, Technology, Operations and Supply Chain Management. He has authored over 500 publications appearing in a wide variety of outlets. He is currently Editor-in-Chief of IEEE Engineering Management Review. His editorial positions cover many leading journals in Operations, Transportation, Supply Chain, and Sustainability Management. Joe has been recognized as a Highly Cited Researcher for each year from 2015-2021 by Thomson-Reuters/Clarivate Analytics (Web-of-Science). Joe is also an international program coordinator for the Greening of Industry Network (GIN) along with the Greening of Industry Networks book series co-editor for Springer-Nature Publishers. He has been recognized as one of the most influential global scholars in the fields of supply chain management, corporate sustainability, operations research, and sustainable supply chains.

The future of CE in GIN

ABSTRACTS

New technologies (IoT, blockchain, drones, autonomous vehicles etc.) in service of Circular Economy

Circular Economy (CE) through collaboration – cognitions and barriers to Sustainable Business Networks

Tawanda Collins Muzamwese[*1]

[1]University of Twente [Netherlands] – Netherlands

Abstract

The attainment of a Circular Economy will require multiple actor collaboration in order to facilitate knowledge exchange, information dissemination and technology transfer in developing and transition countries. Whilst, the role of idiosyncratic organisations in pioneering a CE is widely acknowledged, greater impact can be achieved through collaboration amongst firms. Sustainable Business Networks (SBN) are multi-actor orientations of collaborative institutions which group together for common thematic activities in the area of a Circular Economy. This research is aimed at assessing the role of SBN in facilitating a CE. Specifically, the research aims and understanding the cognitions facilitating network participation as well as barriers affecting adoption of network collaborative activities on CE within the networks. A systematic literature review was undertaken based on keyword focus on networks, circular economy, collaboration and sustainable business networks. Emerging findings point out to various cognitive factors influencing the proliferation of SBN on CE. Leading cognitive factors which influenced adoption of CE and network participation included legislative forces, market pressures, mimetic pressures, isomorphic pressures of organisations wanting to conform to how other firms are practicing CE as well as other ulterior motives such as gaining public relations mileage. The research discusses the legitimacy of some of the motives as varied amongst countries depending on the contextual legal, competitive and market pressures as well as their ability to influence sustainability measures. The research concludes that SBN are enablers of CE transition in developing and transition countries through network participation activities, knowledge generation, knowledge exchange, information dissemination and capacity buildings. However, cognitions and barriers acting upon the network actors have an ability to influence the level of impact. The research further concludes that transition towards a circular economy will be anchored on effective collaboration between and amongst firms in order to scale-up their firm level capabilities.

Keywords: Networks, Circular Economy, Collaboration, Sustainable Business Networks, scaling, up

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[*]Speaker

Managing complex projects in the circular economy: the case of the PlastiCity project

Virginie Litaudon[*1]

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Abstract

Any project, by definition, will have many interconnected components. Projects become increasingly complicated and sophisticated as the number of parts increases. It becomes much more critical when organisations work together to undertake circular operations. The PlastiCity project is no exception: it is a complex undertaking. My PhD research focuses on project management in complex and collaborative settings. It includes observing, doing action research in PlastiCity and interviewing 27 PlastiCity partners. The data collected were then analysed using reflexive thematic analysis. During the conference, I will present the preliminary findings of my PhD research. My research investigates how partners have dealt with complexity in PlastiCity. First, the analysis reveals the complexity dimensions of PlastiCity – structural, socio-political and emergent and environmental complexities – and how such complexities have been reduced using hard methods by the management team and sponsors. The findings reveal that PlastiCity's project management is centred on monitoring, quantitative performance, limited solutions, and a lack of awareness of partners' expectations and involvement. My research raises concerns about the efficacy of such a strategy in terms of project performance and success. I contend that a "reduce" response strategy is not always feasible or efficient. In the PlastiCity project, this strategy failed in project management, performance, and stakeholder satisfaction.

Keywords: Complex projects, project management, complexity, project performance

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[*]Speaker

Assessing and measuring the level of progress and readiness to embark on circular economy : Lesson from Namibia Logistic sector.

Jonas Shafondino Kamakela[*1]

[1]Jonas Shafondino Kamakela – Mauritius

Abstract

The study assessed and measured the level of progress and readiness to embark on a circular economy a lesson from Namibia's Logistic sector. Academics and industry players looked at innovation and approaches to how logistic systems can absorb circular economy principles, however, the level of readiness and progress for the Logistic sector particularly in Namibia to embark on the circular economy still need to be looked at. The study threw out a research question on what system of indicators covers the assessment and measurement for the level of progress and readiness to embark on a circular economy? The Resource-Based View (RBV) and Stakeholder theories underpinned the study in addressing the theoretical framework. The study was of a quantitative research design that took a postpositivist philosophical worldview. The closed-end questionnaires were used to collect data from ten (10) Logistics companies in Windhoek. The closed-end questionnaire was suitable for the study since it helped with identifying variables in the study. The data were analyzed through SPSS software. The study observed a lower significant level between circular economy and level of progress and readiness to embark on green logistics approaches. The study further revealed that the term circular economy or green logistic is not embedded in logistic systems and there is more to be done in order to embark on the circular operation which will require stakeholder engagement, the standard of operation amendment and leadership commitment to full embark on this transformation.

Keywords: Circular Economy, Green Logistics, Logistics, Operational principles, sustainable development

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[*]Speaker

How to drive coffee supply chain toward sustainability: a case study in Vietnam

Thi Thuy Hanh Nguyen[*1], Abdelghani Bekrar[2], Thi-Muoi Le[3], and Mourad Abed[4]

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Abstract

Vietnam is the world's second-largest coffee grower and exporter, as well as Asia's top exporter of Robusta coffee. However, the Vietnam coffee industry is confronted with huge issues since current agricultural farming and processing facilities are unsustainable, resulting in several negative environmental consequences such as deforestation and soil degradation. As a consequence, these issues have reduced coffee output and quality, threatening the competitiveness of Vietnamese coffee products. Furthermore, ensuring the sustainability of coffee growth is critical in developing rural regions in Vietnam, which will ultimately contribute to the overall economic stability of the nation. Growers, manufacturers, policymakers, and customers all around the world have paid significant attention to sustainable agriculture recently. Based on the literature review, moving toward sustainability is critical for the Vietnamese coffee industry to maintain stable output, manage natural resources sustainably, and increase profits. Moreover, understanding the determinants that impact the adoption of sustainable practices has been a long-standing concern in agribusiness management studies. According to previous studies, the percentage of Vietnamese coffee that is grown sustainably is quite small, less than 10 %. Although sustainability is regarded as a critical competitive priority, few researchers have studied the sustainable coffee supply chain in Vietnam. Therefore, the purpose of our paper is to investigate the primary factors that influence the decisions of key stakeholders to adopt sustainable practices.

Prior study has identified three categories of behavioral factors that affect decision-making: dispositional, social, and cognitive (see Figure 1). Dispositional factors consist of personality, resistance to change, risk tolerance, moral concern, environmental concern, and objectives. Social norms and signaling motives are the main elements of social factors. Cognitive factors include knowledge, perceived control, perceived costs and benefits, and perceived risks. The novelty of our research is to focus on key processes of supply chain management including procurement, warehouse, production, and distribution. Figure 2 explains the model framework. The data is collected via a comprehensive survey of key stakeholders of the coffee

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[*]Speaker

supply chain in Vietnam including farmers and coffee companies. To better understand supply chain participants' decision-making process, a questionnaire survey describing behavioral factors is utilized and scored on five-point Likert scales ranging from strongly disagree (1) to strongly agree (5). Each construct's items are collected from earlier studies on related topics. The collected data will next be examined using structural equation modeling, which is appropriate for exploratory research to determine major constructs.

As a result, this paper presents an overview of farmers' and companies' perspectives on adopting sustainable agricultural production. This research investigates the current circumstances of sustainable behaviors of key stakeholders of the coffee supply chain in Vietnam. Based on the findings, we will explore the factors that influence supply chain participants' behavioral intentions toward sustainable practices. Then, we recommend appropriate measures for promoting the sustainability of the Vietnamese coffee supply.

Circular-social business models: digital co-creation

Maria-Laura Franco-García[*1], F Fredenhagen[2], and K Waweru[3]

[1]Faculty of Behavioural, Management Social Sciences, Enschede – Netherlands
[2]Entreamigos – Mexico
[3]Ntashart Eco Green – Kenya

Abstract

As part of the third academic year of bachelor's programs at the University of Twente (UT), the Netherlands, students can select a "minor" course that will help them to expand their knowledge fields and acquire professional skills for coping with complex real life situations. For several years already, the Virtual Project course, component of the Crossing Borders minor, has served as the platform to engage UT students with practitioners from Non- Governmental Organizations, social enterprises and social-Hubs who are physically based in developing countries. The students' assignment aims at further co-create the practitioners' business ideas. Most of those ideas are generated by people who would like to start an enterprise by themselves but they do not know, for instance, how to write a business plan. It can also be that people from those areas would like to develop some products/services for a specific market segment but they want first to benchmark their ideas and/or analyze the market for their potential products. UT students have in this setting the opportunity to collaborate with those practitioners and report either the description of a product, or a market study, or a complete business plan. Students team up in a multidisciplinary and multi-cultural way, team members become self-organized and define the question(s) to be answered, mostly something about: how to co-create a business idea while taking care of the environmental conditions and the welfare of producers and involved community members in the business? The theoretical grounds for the assignments are covered by the UT teachers during 6 weeks and students decide which of the theories better fit the practitioners' business ideas. But students learn, in general, about sustainability, social business model (SBM), circular economy (CE), green marketing, etcetera. The constant interaction with practitioners is facilitated bydigital means. At the end of the project, practitioners are able to digitally meet the students' presentations. For this paper we decided to present some trends of the type of products and businesses that were put forward in the students' reports. For that purpose we used content analysis methods to review 30 reports generated in the last five years. All of the co-created business ideas have particular focus on recycling resources that otherwise would have ended as wastes. Avoidance of waste generation fits directly with CE frameworks. Even further, 90% of the reported business ideas embedded social values in their business models, e.g. any potential income from the sell of the co-created products should importantly be reinvested in capacity building programs for local people where the business was meant to be developed. All in all, we can conclude this research showed the important role of educational programs to support practitioners' efforts towards deploying social / circular business ideas. We recommend further research on teaching tools and methods to co-generate sustainable opportunities to enhance the chances of success of those endeavors.

[*]Speaker

Circular Economy Strategies

Physical Internet and blockchain application on a cross-docking hub network: Research perspective

Tarik Chargui[*1], Yassine Idel Mahjoub[2], Abdelghani Bekrar[2], and Damien Trentesaux[2]

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Abstract

In the recent decade, supply chain has evolved with various concepts that have been introduced in the literature such as Physical Internet, Industry 4.0, Internet of Things (IoT) and Blockchain solutions. Concepts like Industry 4.0 and IoT are mostly applied to the production and smart manufacturing fields, while Blockchain and especially Physical Internet are presented in the literature as paradigms that take the whole supply chain process into account. Most of the studies in the literature of Physical Internet (PI) focus on the global supply chain performance, with few studies on multi-modal cross-docking hubs. The main characteristic of Physical Internet is the use of the PI-containers which are modular, traceable, and standardized in terms of dimensions. The results of such studies validate the impact of Physical Internet on the different Key Performance Indicators, especially transportation costs and sustainability. In the Blockchain-based supply chain, studies were introduced recently focusing mainly on theory-based frameworks. The goal of this study is to show the possibilities of applying the Blockchain as an emerging technology on a Physical Internet network composed of suppliers, customers and cross-docking hubs. A literature review of the applications of Physical Internet and the Blockchain technology will be presented and analyzed. A simulation model will be developed to highlight the impact of blockchain on the cross-docking hubs supply chain network followed by a statistical analysis of the results.

Keywords: Logistics, Physical Internet, Blockchain, Cross, docking hubs.

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[*]Speaker

Physical Internet containers routing in a multi-modal rail-road cross-docking hub

Tarik Chargui[*1], Abdelghani Bekrar[2], and Damien Trentesaux[2]

[1]LAMIH, UMR CNRS 8201 – Laboratoire d'Automatique, de Mécanique et d'Informatique industrielles et Humaines, Université Polytechnique Hauts-de-France – France
[2]LAMIH, UMR CNRS 8201 – Laboratoire d'Automatique, de Mécanique et d'Informatique industrielles et Humaines, Université Polytechnique Hauts-de-France – Université Polytechnique Hauts-de-France, Le Mont Houy, 59313, Valenciennes, France., France

Abstract

Cross-docking platforms have a major role in the performance of the supply chain. Their main role is to transfer products from inbound vehicles, such as trucks or trains, to outbound vehicles. The main characteristic of a cross-docking hub compared to a classical warehouse is the direct transfer of products between the receiving and the shipping area. Recently, several innovative paradigms, such as Physical Internet (PI), have been proposed to improve the performance of the supply chain. The PI concept consists of encapsulating the products in smart, standardized containers called PI-containers which are handled using PI-hubs and transported on PI-movers. In the reviewed literature, most of the mathematical formulations focus on the logistics network and PI-hubs without taking into consideration the possible collisions between PI-containers in the PI-hubs. In this work, we suggest a mathematical formulation for the PI-containers routing in a multi-modal PI-cross-docking hub. The problem, which is formulated as a mixed-integer linear programming model (MILP), consists of finding the optimal path for the transferred PI-containers while avoiding any collision in the sorting area. To better achieve the objectives of sustainability as a backbone of the Physical Internet, the objective function consists of minimizing the energy consumption of the PI-conveyors in the sorting area. The developed model is tested and validated on several instances and provides the optimal solution. Due to the high complexity of the model, two meta-heuristics are developed for the large instances. The obtained results are promising in terms of computational time and solution quality.

Keywords: Logistics, Physical Internet, Cross, docking hubs, Containers routing.

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[*]Speaker

The Application of IOT and Blockchain Technology to Reduce Post- Harvest Food Loss in Developing Countries (Moving Towards Circularity)

Winifred Ereku[*1], Maria-Laura Franco-García[*2], and Michiel A Heldeweg[1]

[1]University of Twente [Netherlands] – Netherlands
[2]Faculty of Behavioural, Management Social Sciences, Enschede – Netherlands

Abstract

Population growth and the consumption of food has been seen to grow globally despite the recent natural disruptions of economic activities as seen during the COVID 19 pandemic. The present- day effects of these happenings and how they unraveled already existing challenges in the food sector in both developed and developing countries appear to have illuminated more pressing issues to tackle in the agricultural value chain. The problem of post-harvest food loss (PHL) is not new. However, it has become a more pressing issue for some countries more than others. This may be due to the economic, infrastructural and technological advancement in some countries and the deficiency thereof in some other countries. Although challenging, the problem of PHL creates opportunities to re-think, re-design and re-create a more sustainable food value chain with the use of impactful technologies whilst moving towards a more circular economy. The potential impact of disruptive technologies such as blockchain, artificial intelligence (AI) and the internet of things (IOT) and their effects or successful application in different sectors including logistics, give rise to the question explored in this study. The research question answered in this study is: How will blockchain technology, internet of things and artificial intelligence impact post- harvest food loss reduction efforts when applied in the food supply chain in developing countries? The methodological approach employed in this study is both explorative and descriptive. Secondary data was gathered with a focus on relevant literature review of studies and cases where the blockchain technology, AI and IOT were applied to reduce PHL across the food value chain. Following this, a description of the application of these technologies in the food sector of developing countries ensued. Socio-technical systems theory was used to understand the different aspects of the food value chain system and the impact of technology in reducing PHL. The findings of this research study indicates that there have been more applications (in general) and also, more successful applications of the blockchain technology, AI and IOT in the food value chain of developed countries than in developing countries. A proper understanding of the primary drivers for the successful application of these technologies and how they promote sustainable development and circularity in developed countries may lead to more applications in developing countries. However, proper consideration should be given to the local contexts of these countries and the level of "transferability" or "adaptability" of the successful methods of applying and adopting these technologies. Exploring the methods for integrating already existing practices to reduce food loss with a circular economy approach in developing countries are areas recommended for further research.

[*]Speaker

The Application of IOT and Blockchain Technology to Reduce Post- Harvest Food Loss in Developing Countries (Moving Towards Circularity)

Ankit Gaur*[1] and Diego Vazquez-Brust[2]

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[2]Diego.vazquez-brust@port.ac.uk – United Kingdom

Abstract

Population growth and the consumption of food has been seen to grow globally despite the recent natural disruptions of economic activities as seen during the COVID 19 pandemic. The present- day effects of these happenings and how they unraveled already existing challenges in the food sector in both developed and developing countries appear to have illuminated more pressing issues to tackle in the agricultural value chain. The problem of post-harvest food loss (PHL) is not new. However, it has become a more pressing issue for some countries more than others. This may be due to the economic, infrastructural and technological advancement in some countries and the deficiency thereof in some other countries. Although challenging, the problem of PHL creates opportunities to re-think, re-design and re-create a more sustainable food value chain with the use of impactful technologies whilst moving towards a more circular economy. The potential impact of disruptive technologies such as blockchain, artificial intelligence (AI) and the internet of things (IOT) and their effects or successful application in different sectors including logistics, give rise to the question explored in this study. The research question answered in this study is: How will blockchain technology, internet of things and artificial intelligence impact post- harvest food loss reduction efforts when applied in the food supply chain in developing countries? The methodological approach employed in this study is both explorative and descriptive. Secondary data was gathered with a focus on relevant literature review of studies and cases where the blockchain technology, AI and IOT were applied to reduce PHL across the food value chain. Following this, a description of the application of these technologies in the food sector of developing countries ensued. Socio-technical systems theory was used to understand the different aspects of the food value chain system and the impact of technology in reducing PHL. The findings of this research study indicates that there have been more applications (in general) and also, more successful applications of the blockchain technology, AI and IOT in the food value chain of developed countries than in developing countries. A proper understanding of the primary drivers for the successful application of these technologies and how they promote sustainable development and circularity in developed countries may lead to more applications in developing countries. However, proper consideration should be given to the local contexts of these countries and the level of "transferability" or "adaptability" of the successful methods of applying and adopting these technologies. Exploring the methods for integrating already existing practices to reduce food loss with a circular economy approach in developing countries are areas recommended for further research.

*Speaker

FAHP-MCDA Tool for SSCM implementation in VUCA times

R. Saha Roy[*1] and K. Ahmed[2]

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Abstract

With the onset of the COVID-19 pandemic and BREXIT, there is a prominent need for expanding comprehension of seismic impact of VUCA conditions on supply chains. During VUCA times, supply chains regularly struggle to maintain and implement sustainability across production lines; hindering swift decision making for business growth and impacting selected KPIs. This is further exacerbated due to multiplicity of theoretical models delineate KPIs applicable to a particular industry. However, these existing models neither facilitate industrial independence nor guide their decision-making processes, thus creating a research gap that requires further exploration. Decision-making processes for procurement or business area growth can be quite time-consuming while being complicated due to the multiple criteria inherent within, with the added complexity of VUCA conditions. This raises the question of "What mathematical model can be developed to help in decision making during VUCA times?" o resolving this, this paper discusses an interactive mathematical tool using modified Fuzzy Analytic Hierarchy Process (FAHP) based calculation to aid in organizational decision-making. This is through suggesting the most sustainably viable option a supply chain organization can implement based on the multiple criteria available to that organization during VUCA times (e.g., COVID-19). This model gives the user/organization the independence to set their own criteria, moving away from pre-defined lists of theoretical KPIs to choose from, with better alignment to industrial requirements. To ratify the model, three different case studies have been applied to the MCDA model and the results have been verified with actual decisions made. This model correctly ranked the best options. It also indicated that multiple meetings and conferences organizations usually must conduct during the decision-making processes could be removed; thus, saving on valuable time and resources. This paper subsequently concludes by highlighting future applications of this MCDA Model and the scenarios it can be further applied to, leading to a more streamlined sustainability implementation within supply chains, and guiding decision making during VUCA times.

Keywords: Digitalization, Sustainable Supply Chain, FAHP, MCDA, Fuzzy, Decision Making, Sustainability

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*Speaker

Logistics 4.0 through Circular Economy principles in the era of IoT

Artificial Intelligence and Internet of things for an effective circular economy implementation: a reverse logistics case study

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Abstract

Circular economy (CE), and the circular rationality that underpins it, takes the form of an economic model for efficient use of resources by extending the useful life of materials, reducing waste and raw resources usage, and adopting environmentally friendly socio-economic systems (Barreto et al., 2021). CE mirrors the idea of building new organizational values under the pressure exerted by the limit of natural resources, and attracts the attention of large companies as well as pioneers of innovation (Ünal et al., 2018). However, management practitioners are still struggling to develop frameworks to support the transformation of linear business models towards efficient new based CE models. Therefore, managers are invited to focus their attention on the macro loops implementation of CE and deal with product-life issues, promote remanufacturing, redistribution, reuse and recycling, etc (the 7R') (Urbinati et al., 2017). Industries are thus required to rethink their supply chain capabilities to embrace better the CE values. This is possible via sustainability focused innovation capabilities that improve industries' ecological efficiency, empowering them to create market value (Watson et al. 2018). Such steps suggest the involvement of different stakeholders to bring together the collaboration and knowledge needed for developing and enabling an efficient circular flow of material and resources (Ranta et al., 2018). This resource-based view (RBV) does not only outline the role resources play to assist organisations to create, nurture, and maintain competitive advantage, but it also to put together collective resources enabling the emergence of competitive advantages to compete favorably in a globalized and highly competitive market (Assensoh-Kodua, 2019). At the same time, RBV needs to be achieved throughout the unfolding of information technology for fast and accurate communication inside and outside the organization. This study is based on the work of Nayal et al. (2021) and the application of their conceptual model to HP Brazil & Sinctronics context of creating a reverse logistics ecosystem. The analysis examines the impact of artificial intelligence–internet of things (AI-IoT) adoption on supply chain performance under a CE environment based on RBV. Primary results suggest that CE implementation affects both the organization and the technology adoption process. The supply chain flexibility and performance are also subject to influence.

Keywords: Circular economy, AI, IoT, RBV, supply chain, reverse logistics

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[*]Speaker

The Application of IOT and Blockchain Technology to Reduce Post- Harvest Food Loss in Developing Countries (Moving Towards Circularity)

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Abstract

Population growth and the consumption of food has been seen to grow globally despite the recent natural disruptions of economic activities as seen during the COVID 19 pandemic. The present- day effects of these happenings and how they unraveled already existing challenges in the food sector in both developed and developing countries appear to have illuminated more pressing issues to tackle in the agricultural value chain. The problem of post-harvest food loss (PHL) is not new. However, it has become a more pressing issue for some countries more than others. This may be due to the economic, infrastructural and technological advancement in some countries and the deficiency thereof in some other countries. Although challenging, the problem of PHL creates opportunities to re-think, re-design and re-create a more sustainable food value chain with the use of impactful technologies whilst moving towards a more circular economy. The potential impact of disruptive technologies such as blockchain, artificial intelligence (AI) and the internet of things (IOT) and their effects or successful application in different sectors including logistics, give rise to the question explored in this study. The research question answered in this study is: How will blockchain technology, internet of things and artificial intelligence impact post- harvest food loss reduction efforts when applied in the food supply chain in developing countries? The methodological approach employed in this study is both explorative and descriptive. Secondary data was gathered with a focus on relevant literature review of studies and cases where the blockchain technology, AI and IOT were applied to reduce PHL across the food value chain. Following this, a description of the application of these technologies in the food sector of developing countries ensued. Socio-technical systems theory was used to understand the different aspects of the food value chain system and the impact of technology in reducing PHL. The findings of this research study indicates that there have been more applications (in general) and also, more successful applications of the blockchain technology, AI and IOT in the food value chain of developed countries than in developing countries. A proper understanding of the primary drivers for the successful application of these technologies and how they promote sustainable development and circularity in developed countries may lead to more applications in developing countries. However, proper consideration should be given to the local contexts of these countries and the level of "transferability" or "adaptability" of the successful methods of applying and adopting these technologies. Exploring the methods for integrating already existing practices to reduce food loss with a circular economy approach in developing countries are areas recommended for further research.

[*]Speaker

Blockchain and Smart Contracts adoption for Autonomous Train Deployment

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Abstract

Transportation sector is witnessing a considerable growth, especially with the emergence of new technologies such as big-data, artificial intelligence, internet of things, and recently Blockchain. These technologies along with the requirements of industries to improve the deployment of transportation systems led to autonomous vehicles apparition which paved the way for passenger and freight Autonomous Train (AT) development. AT deployment is meant to improve overall safety and security; increase service reliability and availability by addressing human errors and saving time; minimize energy consumption; meet the high demand of passengers and freight transportation by enhancing service flexibility and fleet management; and increase the existing capacity and utilization of rail lines. Nevertheless, AT operation faces several challenges that current studies attempt to overcome some issues including safety and security; learning and decision-making; fleet coordination and interoperability; traceability and sustainability; and human interaction to name few.
Due to its attractive features, Blockchain is a promising technology that could address some of mentioned AT challenges. It is a distributed ledger technology that enables the storage of decentralized, trusted, secure, and chronological data shared among nodes through a peer-to-peer network. It provides data transparency and traceability along with user anonymity. Furthermore, it is a fault tolerant technology and can be used for automation purposes relying on Smart Contracts.

Based on the Blockchain, AT operations may be decentralized by allowing trains to make decisions while moving on the tracks (e.g. finding safe routes) without the need of central control offices by the means of Smart Contracts. Train/train and train/infrastructure communication could be realized in a Blockchain network enabling information exchange in order to safely operate and to provide a better fleet management. Moreover, information about trains and infrastructure could be stored in the Blockchain to allow traceability for maintenance or scheduling goals. Ticketing and payments could be performed rapidly without the need for third parties using cryptocurrencies and Smart Contracts. Many other functions could be improved when deploying AT using this disruptive technology.
The aim of this paper is to highlight Blockchain opportunities for the AT. After a brief introduction, some backgrounds about Blockchain and Smart Contracts are discussed. A survey is further presented about the autonomous train on one hand and Blockchain applications

*Speaker

in transportation on the other hand. Moreover, some challenges of AT deployment are discussed alongside Blockchain's advantages to mitigate them. Finally, a potential case study on a Blockchain and Smart Contracts-based modeling and control of a Railway Interlocking System is introduced for future work.

Strategic location of a perishables redistribution centre in Europe: exporting vegetables from south-eastern Spain

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Abstract

This work aims to contribute to the debate on the practical utilization of different location models for consolidation, redistribution and repackaging centers in a supply chain network. More specifically, comparisons are made between the p-median, gravity p-median and p-center methodologies, as adapted to the characteristics of a specific case. The scenario in question is the creation of a redistribution center for highly perishable products (fruits and vegetables) from southeast Spain-the leading European supplier-destined for customers throughout Europe. In theoretical terms, it is demonstrated that the Gravity p-median model can generate advantage, from an empirical point of view, when the nature of merchandise requires closer proximity to the customer, at centrally located points and in contexts of uncertain short-term demand. This strategy would achieve reducing the response time (shipment from distribution center to customer), thereby substantially improving service. In addition, the strength of the p-median and p-center models is tested in relation to the long-term changes in demand conditions, corroborating greater robustness in the case of the p-median model. Regarding the solution to the empirical problem of creating a fruit and vegetable redistribution center in the center of Europe, various options can be proposed. If the decision is made to create a single center at destination, the ideal location would be the Netherlands. This scenario is validated considering the present reality, as this country displays a proven capacity for reexportation. If two centers are to be established at destination, Belgium would supply the west and south of Europe and Germany would distribute to the east and north of Europe. It is worth highlighting that this work is the first explore this subject as applied to a real case, and such research is necessary to maintain the competitiveness of this key export sector in Spain. This study has not contemplated the cost of the proposed facilities, the need to establish a packing plant near the customer, or even part of production. These aspects deserve their own exclusive analysis. Note that the proposed distribution strategy would require a "refinement" of of Cross-docking works, e.g, the use of different transportation mode, temporary storage capacity, or cupplement with other merchandise. Ultimately, these strategies require a collaborative effort to be made by commercialization companies at origin, an aspect which makes their implementation more complicated.

[*]Speaker

Integration of Blockchain Technology in the Citrus Food Supply Chain: A systematic literature review

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Abstract

Context: Researchers are working on Blockchain technology due to its various applications in various sectors as the next significant technological aspect. Blockchain technology has emerged as a viable concept with far-reaching significance in the food industry. Using Blockchain Technology in the food supply chain will secure the processing and storage of administrative information and digital authenticity to reinforce intellectual property and patent systems, increase supply chain visibility, prevent food fraud, and improve food security. Also, the development of fruit for a well-balanced diet and public awareness of citrus fruit benefits have driven growing demands in recent times. As a result, both industrial practitioners and academicians are now interested in the Citrus Food Supply Chain (CFSC).

Theoretical Framework: We will make two contributions from a theoretical viewpoint. Firstly, this paper adds to the few earlier studies that have looked into blockchain technology in the CFSC. Secondly, Bibliometric processes have not thoroughly examined the assessment of blockchain research on the CFSC. For this reason, we will use the keyword co-occurrence methodology to synthesize relevant literature on blockchain use cases in the CFSC. As a result, this research will provide a thorough examination and a timely summary of the literature.

Research Question: Although the promises and industry buzz, there is currently a lack of a complete analysis of blockchain's potential opportunities and challenges in the citrus food supply chain. Our research questions are:

- What is the current use of Blockchain technology in the Citrus Food Supply Chain?
- What are the Potentials and drawbacks of implementing blockchain in the Citrus food supply chain?

Method: We'll conduct a systematic literature review (SLR) to discover, analyze, and interpret research and advancements related to blockchain technology's applicability in the citrus food supply chain. We will use the software VOS viewer to conduct the bibliometric analyses.

Findings: We will review existing research and advancements in applying blockchain technology to the Citrus Food Supply Chain, highlighting the benefits and drawbacks. Finally, we will discuss the limitations of this research and possible recommendations for the future.

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[*]Speaker

Transport

Hybrid Model for Sustainable Third-Party Logistics Truck-Route Assignment Problems: A Case Study of Construction-Related Product Business in Thailand

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Abstract

Increased competition in the transport market has not only led to company's increasing cost consideration, but also human pollution concerns. In large-scale construction-related products that requires several third-party logistics providers to handle daily orders, the operative planning task is already a challenging task for the management of such transportation complexities. The transport planner must decide which logistics providers to handle delivery orders based on possible routes, cost offers, quantities to be delivered simultaneously while the environmental impact of carbon dioxide emission by 3PL partners is not considered.

We therefore propose a hybrid assignment-routing model for these operative planning tasks using Mixed-Integer Programming (MIP) that consider cost effectiveness and environmental impacts simultaneously in 3PL settings. The model applied to a real case of construction-related product business in Thailand. There are two stages for the hybrid model. The first stage is to assign shipment orders to different 3PL vehicles with the lowest number of vehicles used. Then, the second stage is to determine the best routes for all 3PL vehicles. Additionally, we evaluate the results in two scenarios. The first scenario is the existing scenario, which is the current practice of the company case study. The total cost calculation is based on the maximum distance and unit cost per ton. The second scenario calculates total cost based on the actual distance and new unit cost from the output of the hybrid model.

The results show that the second scenario provides lower transportation cost than the first scenario around 9-15 percent for both single and multiple customer regions. Also, the second scenario proposes the standardization of additional drop cost calculation to support 3PLs. For the fuel emission, the second scenario provides lower fuel emission rate approximately 10 percent after comparing with the first scenario. The model can also be applied in the general industry where level of complexity in managing 3PLs is high.

Keywords: MIP, Assignment Problem, Third Party Logistics, Optimization, Truck Routing

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[*]Speaker

Modal shift : Intermodal transportation and CO2 emission reduction

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Abstract

Transportation and logistics have experienced an important development in terms of services planning and optimisation. One of the major issues is their impact on the environment and society, because the activity is still largely based on road mode. Alternatives are not lacking, but are still struggling with levels of sophistication. The contributions in this area are dedicated to green supply chain models at strategic level. In contrast, there are comparatively fewer contributions at tactical level aiming at both economic and environment efficiency. The objective of this paper is to establish a literature review of intermodal transportation networks optimisation models at tactical level of decision, integrating sustainability objectives. We focus on those which emphasised the intermodalism with or without stressing CO2 emissions objectives. We found that the majority of these models have a potential impact in terms of CO2 emissions reduction even if this is not stated as premium objective. We fianlly made an analysis and a computation of impact in term of CO2 emissions on the basis of a case study and an existing model (Laaziz and Sbihi 2019).

Keywords: Modal shift, intermodal transportation, logistics, sustainability, CO2 emissions, road mode, network design, optimisation models

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[*]Speaker

Environmental impacts of the Collaborative Intelligent Transport Systems (C-ITS): survey and research directions

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Abstract

The awareness of the climate emergency makes environmental issues a priority at many levels. In addition to political initiatives, research on the reduction of the environmental impact of human activities is on the rise. Among these activities, the transportation sector is among the most polluting. In parallel to the efforts to electrify vehicles, many works are focusing on the reduction of gaseous pollution of thermal engines. In addition, a significant amount of research is being done on the automation of vehicle driving. Thus, the suppression of the human factor can lead to an enhancement of road safety, an improvement in comfort as well as a better energetic performance. This enhanced efficiency translates into reduced fuel consumption. However, before reaching a fully autonomous vehicle, and considering the great complexity of such task, many intermediate steps must be taken. Thus, Connected Vehicles (CV), coupled with connected infrastructures, allow the emergence of Collaborative Intelligent Transport Systems (C-ITS). The CVs allow a large number of promising perspectives. In this article, the focus is on reducing the environmental footprint through C-ITS. The survey of the various contributions from the literature, highlights the possibilities offered by such technologies. Indeed, the following question is explored: how can these different C-ITS technologies help to optimize fuel consumption? Many works have shown that fuel consumption and CO_2 emissions can be described as functions of speed. Some applications, like the Green Light Optimized Speed Advisory (GLOSA), allow regulating the speed of the vehicle. With the development of technologies like the Internet of Things (IoT) and its entry into vehicles, new applications to reduce the environmental impact of transportation are made possible. A review of the literature allows understanding all the new possibilities offered, as well as the research trends that are emerging.

[*]Speaker

Building sustainable port competitiveness construct: a case study of Chinese ports clusters

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Abstract

Ports are key players in global logistics and supply chain since they handle over 90% of cargoes carried throughout the world in terms of volume. The continuous investment and expansion of ports puts forward new requirements for the sustainable management of ports. Port competitiveness is becoming an increasingly relevant subject due to the value that ports create for enterprises in the maritime supply chain and more broadly, for the economic, social, and environmental development of the region in which they are located. This paper aims to investigate how ports and relevant stakeholders realize ports competitiveness and what the ports can do to improve and maintain their sustainable competitiveness. Utilizing a grounded theory-building approach, we conducted and analyzed 37 interviews with port stakeholders in China such as industrial experts, Chinese port companies and its stakeholders including shipping lines, cargo forwarders and port service providers. These respondents are considered representative of both academic and industry understanding because they have deep experience in work or research. Through two rounds of qualitative analysis of the interview draft using Nvivo software, a theoretical framework was accordingly developed to deeply understand the relationships of four constructs to port sustainable competitiveness: internal and external capabilities have a direct effect on port sustainable competitiveness and are moderated by supply chain integration strategies and port cooperation strategies. By building a new competitiveness construct that addresses these challenges, the theoretical model developed in this study contributes to the literature stream of port competitiveness and port supply chains. Based on our theoretical model, port managers will be able to evaluate their own long-term competitiveness and improve their potential capabilities.

Keywords: Sustainable port competitiveness, Grounded theory, Chinese port clusters

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[*]Speaker

Digital framework for a sustainable supply chain

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Abstract

The "France Relance Plan" was introduced on September 2020 by the government to provide support to French businesses, including a series of measures not only aimed at economic recovery but also at ecological transition. As part of France Relance Plan, this collaborative project conducted with a transportation company located in the Hauts-de-France territory, seeks to model sustainable solutions around the transport activities, in order to optimize, streamline and improve the supply chain's performance and consequently, accelerate the green transition.

The most important purpose is to elaborate a framework based on the use of digital tools, taking to account full logistics portfolio's transportation company as well as the supply chain stakeholders' network, and thus allow for logistics mutualization, long-term sustainability, and cost recovery. This means, that the project has to define an overview of the company's strategy around digital capabilities and environmental solutions, with the aim to facilitate the sharing of dynamic and static information and increase the visibility of business data, to improve costumers' responsiveness and costumer's reliability, and to simulate economic, social and environmental impacts assessments, enhanced productivity of the transportation company's investments.

For this to be successful, the structure's project is deployed in two phases: at first, it must identify technology requirements in the actual transport's activities, and measure the issues due to lack of information technology resources, in this way will it be possible to map the AS-IS of company's digital supply chain process, and then be able to create the TO-BE scenario, that will be consider like the optimal digital structure. Secondly, it is expected to quantify the reduction of environmental and social impact, setting the performance metrics and the good practices for the company.

To achieve this, the project supports the digitalization approach with the use of SCOR model, the leading supply chain management framework. SCOR will provide a reference of supply chain transport operations to design the optimal structure, besides highlighting the digital opportunities to improve it, and therewith support the transportation company in the digital transition as an enabling process of the sustainable logistics network.

Keywords: Digitalization, Sustainability, Supply Chain, SCOR.

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[*]Speaker

Identifying and Overcoming Circular Economy Challenges

Barriers to the implementation of Circular Economy in the Spanish agrifood sector: a challenge to be overcome

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Abstract

This study aims to identify the main barriers and limitations encountered by Spanish farmers when introducing Circular Economy in their production processes. The term Circular Economy is presented as an alternative capable of improving the current linear production systems, as well as allowing them to be more efficient with respect to practices carried out in the crop. In this way, this study delves into the difficulties that farmers are facing when making this transition in their farming models to thus improve their current and future situation in terms of sustainability. In order to obtain a general and real overview of the main existing barriers, an online survey has been carried out. The profile selected for the collection of information has been farmers who focus their activity on the cultivation of vegetables under greenhouse in the Spanish territory. This questionnaire consisted of a total of five open-ended questions aimed at finding out what support they would need to become more circular, the regulations that are negatively affecting their transition to more sustainable production processes or the action plans that should be considered in future policies. Among the results obtained, several types of responses were identified, framed according to their economic, educational and cultural nature. In this way, the present work considers those limitations that farmers regard as challenges to be overcome in order to be taken into account. For all these reasons, the results of this work are believed to be of great interest to researchers, farmers in other territories and policy makers who need updated information on the subject.

Keywords: Circular economy, productive models, sustainable development, circular farming, agriculture

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[*]Speaker

Different stakeholders' perspectives on obstacles to the Circular Economy

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Abstract

Circular Economy (CE) attempts to improve the environmental and economic performance of existing linear economic production systems and particularly waste management through the introduction of principles of reduction, reuse, recycling, recovery, redesign and remanufacture However, there are still many challenges regarding its implementation.
Previous studies argue about distinct obstacles to implementing circular practices related to supply, demand, regulation and policy, technology, finance, supply chain coordination, performance management, and organizational practices. Most of them highlighted the need for more investigation on hurdles to implementing CE to help understand the relations and interdependencies between them (Govindan and Hasanagic, 2018; Ritzén and Sandstrom, 2017). Mangla et al. (2018) highlight some obstacles to circular supply chain management in developing countries. They are mostly related to lack of economic benefits in the short run, lack of appropriate training, coordination, and collaboration, lack of consumer awareness, lack of support and participation of stakeholders, lack of environmental laws and regulations, and finally lack of management commitment. Fratta et al. (2019), in research conducted about urban waste in the municipalities of ABC Paulista (a group of industrial cities close to São Paulo city), in Brazil, concluded that the main problems are related to the lack of participation of distinct stakeholders in the reverse logistics process as manufacturers, importers, distributors, and traders. They also mention the lack of inspection of the irregular disposal of waste and the need of implementing environmental school education.

This article aimed to investigate the obstacles to adopting CE practices in the Brazilian waste management system. The empirical research was conducted in Brazil in two stages. The first stage was held in June 2019. A workshop was conducted at the University of São Paulo, Brazil, with researchers and practitioners from five companies. In the second stage, from June to August 2020, 26 interviews were conducted in 22 entrepreneurial organizations across five different categories of the waste system. This multi-stakeholder sample aimed to allow the participation of various players in the waste ecosystem. A content analysis was performed using the NVivo 12 software.
The paper provides a comprehensive view from the perspective of multiple stakeholders in a waste management system in a developing country. The outcomes indicate that obstacles to the implementation of circular economy practices are related to a lack of knowledge for

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[*]Speaker

moving from traditional to the circular system, market barriers to the use of recycled waste, and lack of legislation and coordination of distinct levels of government. The outcomes also indicate that technical solution is available in some situations. However, organizations face economic and financial obstacles to adopting them. New dimensions for explaining obstacles to CE in developing countries also emerged from field research as the low market value of some residues as a hurdle to recycling them and the informality of some important agents in the system, such as waste pickers. The research also highlighted the relations between obstacles - as government obstacles and structural obstacles - and presented some propositions for analyzing the relations between obstacles in developing country contexts.

Digital responsible entrepreneurship: studying its role in the transition to a circular economy

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Abstract

The circular economy (CE) and the enabling role of digital technologies has been identified as
a promising approach for business to promote environmental, social, and economic
development (Kristoffersen, et al 2020). Nevertheless, this model and the new digital reality
require changes in the way companies conduct business and generate value (Suchek et al
2021). In this sense, and independently, different research lines have emerged in the field of
entrepreneurship that attempt to examine new entrepreneurial practices that consider
variables that go beyond economic performance. As a result, two complementary forms of
entrepreneurship are identified: responsible and digital entrepreneurship (George et al 2021).
New businesses are springing up to integrate economic, social, and sustainable values into
their activities enabling new practices that help to address major social and environmental
challenges (Bican & Brem, 2020).
In this context, the purpose of this paper is to offer an integrative theoretical conceptualization
of responsible and digital entrepreneurship that helps to understand its underpinnings and
differential characteristics in comparison to traditional entrepreneurship, and to put spotlight
on CE investigation. The ultimate goal is to evidence the existence of an emerging type of
entrepreneurship that deserves consideration and paves the way to overcome the challenges
inherent to the CE. To this end, a systematic search of the literature is carried out, to identify,
classify and evaluate the outstanding contributions of the currently scattered fields and provide
relevant insights. As a result of the search, a total of 2.313 papers addressing responsible
and
digital entrepreneurship and circular economy, between 2000 and 2022, in the Web of Science
database have been obtained. This preliminary analysis has helped to gain a rigorous
understanding of the concept of digital and responsible entrepreneurship and its role in
facilitating the transformation to a circular economy. Finally, a conceptual framework is
presented, and theoretical implications are drawn.
The results show the complementarity of digital and responsible entrepreneurship and their
distinctiveness compared to traditional entrepreneurship in terms of motivations, process
transformation, new business models development, new offerings, a differentiated ecosystem,
and refocused results. Digital responsible entrepreneurs, adopting innovative business

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[*]Speaker

practices, can enhance efficiency, and reduce waste, create value beyond mere consumption, (educational value and awareness), as well as strengthen and deepen interaction with the different stakeholders.

A literature review about uncertainty in remanufacturing under the perspective of Circular Economy

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Abstract

One of the current global challenges is the transition from a linear economy to a Circular Economy (CE). In the CE, remanufacturing is essential because it promotes environmental, social and economic benefits. However, a company decision to invest in remanufacturing will not always be easy, as there are several economic factors at play. For example, there is a high degree of uncertainty in remanufacturing that involves demand behavior, consumer acceptance to pay for end-of-life products, the supply and conditions of the products that will be collected. The purpose of this review article is to answer the following research question: (1) *How is characterized the scientific production about uncertainty in remanufacturing from Circular Economy perspective?*

Milliken (1987) defines uncertainty as an individual's perceived inability to accurately predict something. This individual is subject to uncertainty because it is possible to observe that he does not have enough information to make reasoned decisions. Knight (1921), in his publication entitled "Risk, Uncertainty and Profit" discusses that risk and uncertainty are distinct. Risks have probabilities and results that are calculated and optimized. Conversely, in uncertainty, the basis for calculating the probabilities of results and also their impact is practically non-existent. Rice et al. (2008,) classified the uncertainties into: (1) Technical Uncertainties which are related to technological aspects. For example: the reliability of manufacturing processes, performance, maintainability, among others; (2) Market Uncertainties which refers to customer needs, appropriateness of sales/distribution methods. It also involves understanding competitors' products; (3) Organizational Uncertainties which are related to the organizational context of the company, such as politics and power; (4) Resource Uncertainties that refers to financial resources (investments) but also with the competence to achieve certain opportunities.

In this paper, we adopted the typology proposed by Rice et al. (2008) to identify and classify uncertainties. We also adopted Milliken's definition of uncertainty. In the methodological process, we identified the scientific production on uncertainties in circular economy remanufacturing using bibliometric analysis. We carried out a bibliometric analysis of 49 documents using the software Rstudio, Bibliometrix and VOSviewer. Data were collected from Scopus and Web of science database.

The results indicate that the Journal of Cleaner Production published 22.44% of the sample documents, and the paper "Circular Business Model Innovation: Inherent Uncertainties" is the most cited document in the sample. Furthermore, we identified that the main uncertainties in the remanufacturing scenario are market and resource uncertainty. We also

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[*]Speaker

identified that market uncertainty is related to the acceptance of remanufactured products by consumers. There is still resistance from consumers in purchasing remanufactured products regarding the quality of these products. In addition, the implementation of remanufacturing presents technical uncertainties, especially in the disassembly phase of products. The results also indicate organizational uncertainties, since remanufacturing requires a well-structured supply chain. Remanufacturing in the context of the CE not only involves the return of end-of-life products, but also involves returning those products to the market after the re-manufacturing process.

Business model innovation of port authority as a pathway for accelerating circular economy implementation: an in-depth study of a Baltic Port Authority

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Abstract

In recent years, Circular Economy (CE) has been gaining increased attention from society and academia. Consumers' interests in sustainable travelling and consumption are increasing. Ports are essential for enhancing shipping efficiency, a critical transportation mode for global trading (International Maritime Organization, 2020). Despite the increased studies on the central European port's role in the CE (de Langen and Sornn-Friese, 2018; Haezendonck and Van Den Berghe, 2020), Baltic port authority's business models for adapting circular economy gained limited attention.

CE's implementation would threaten the port authority's current business models because the transport demand would reduce for primary (bulk) materials, as the recycling and reutilizing rates would increase (de Langen and Sornn-Friese, 2018). Therefore, urgent innovations in the port authority's business model are demanded.

This paper aims to illustrate that the port authority's business model innovation can be a pathway to accelerate the transition to the CE. The research goal is to identify the critical actor, resources and activities for the port authorities to innovate the business model. An in-depth case study of a Baltic Port Authority's business model innovation process is designed to approach the research question. The case port is an urban RoPax and cruise-ferry terminal attempting to upgrade its facility and business model to offer more sustainable and empathetic terminal services. Several challenges exist due to the scarcity of resources and knowledge. The port authority needs to overcome the space limitations; coordinate with numerous stakeholders to implement new technologies; alleviate conflict of interests between the city and residents in the neighbourhoods.

The analytical framework is based on the Actor, Resources and Activity (ARA) model (Håkansson and Snehota, 1995), which depicts the business model transitions in the case port authority. The changes in the business model and consequential impacts on the transition towards CE are identified. The research outcome suggests a pathway that ports of similar size and operational profiles could follow.

Keywords: Circular Economy, Port, Business Model Innovation, Baltic Region

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[*]Speaker

Waste management

Waste management practices in Indian hospitals during COVID-19

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Abstract

This research aims to explore medical waste collection and disposal strategies adopted by hospitals in developing countries during the COVID-19 outbreak focusing on hospitals in India. Management research identifies that organisations develop various strategies in response to crisis including retrenchment, preserving, innovating, and exit (Wenzel et al., 2020). During the COVID-19 outbreak, hospitals have experienced an increased demand for their services, shortage of medical supply and increase in turnaround of medically certified personal protection equipment. Increased demand generates higher waste volumes during short times, stretching the capabilities of regular waste management practices in private and public hospitals and leading to concerns about efficiency and safety of waste disposal (Pandey et al., 2019; Hanumaiah et al., 2020). The COVID crisis has challenged hospital management to maintain safe and effective medical waste management and has disrupted the existing waste collection and management practices. The research aims to examine: 1) how medical waste management in developing countries is affected during the COVID-19 outbreak; 2) how do hospitals in developing countries respond to the crisis by maintaining resilience, quality and continuity of waste management operations through reconfiguration, realignment and reorganisation of practices (Huikkola et al., 2016). In the course of the summer 2021, we collected interviews with doctors, hospital staff and other stakeholders examining waste management practices in Indian hospitals during the COVID-19 pandemic. Overall, we have collected 28 interviews and we analyse them qualitatively using a thematic analysis. Preliminary analytical themes include: strategic responses to crisis (Wenzel et al., 2020); resource realignment (Huikkola et al, 2016), and organisational learning (Argote and Miron-Spektor, 2011). The crisis revealed many issues around waste disposal and recycling and has highlighted the need to work on improving waste management operations and related supply-chain channels in India. The study aims explore the avenues for transition towards circular waste management that is safe and efficient, and that can be replicated in other developing countries. The research aims to envisage how waste management practices in the healthcare sector can adopt circular economy principles in the post-COVID environment.

Keywords: waste management, India, hospital waste

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[*]Speaker

The state of the art of studies on food waste in supermarket retail

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Abstract

It is estimated that 1.6 billion tons of food are wasted annually worldwide (BCG, 2018). This issue need to be solved globally and, in this sense, it has become part of the Sustainable Development Goals (SDGs) by the United Nations (UN). One of the SDGs from 2030 Agenda, SDG 2, aims to cease hunger, achieve food and nutrition security and promote Sustainable Agriculture. It was investigated the state of the art of scientific publications regarding the practices of preventing and reducing food waste in supermarket retail, through a Systematic Review of Literature (SRL). The strings used in the three chosen databases (Scopus, Web of Science and Capes Periódicos) returned 1,115 scientific articles. The filters used were: only scientific papers; open access; date range 2011 - 2021; in English, Spanish and Portuguese language; areas of knowledge related to the subject of the study. Inclusion and exclusion criteria in the reading of articles. Thus, 45 articles were selected. Results: research methods were case studies, literature review, document analysis, focus groups, interviews and statistical analysis of data. None of them aimed to combine quantitative and qualitative methods, including gravimetry, structural analysis and multicriteria methods. Also, none of them with exclusive focus on waste prevention and reduction practices in retail, with the application of gravimetry, to directly investigate the amounts of food wasted in stores. The countries with the greatest representation of these studies: 1st) Germany and the United Kingdom; 2nd) Italy; 3rd) USA; 4th) Sweden and Brazil; and other countries, such as Sri Lanka, Croatia, Poland, Lithuania, Serbia, Denmark, Spain, Warsaw, Tunisia, Turkey, Canada, Austria, Finland, Portugal, Israel, New Zealand and Vietnam. The objectives of the studies sought to analyze: 1) anti-waste practices and strategies: 23 articles; 2nd) causes of waste: 15 articles; 3rd) perception/importance given to the theme: 9 articles; 4th) identification of amounts of lost/wasted food: 8 articles; 5th) proposal of a method/model/tool to combat the problem: 3 articles. In addition, the contributions of the articles are based on: diagnosis/analysis of waste: 36 articles; proposals for waste prevention and reduction practices: 5 articles; diagnosis/analysis/strategy proposition: 3 articles; and gaps in waste: 1 article. In this way, it is observed that applied research is still incipient that aims to actually develop preventive and corrective actions of management in supermarket operations to contribute to the mitigation of food waste in the retail sector.

Keywords: food waste, supermarket, RSL

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[*]Speaker

PlastiCity: Scenarios for collecting plastic waste in Ghent, The Hague, Douai and Southend-on-Sea

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Abstract

Plastic is a fantastic material: cheap, lightweight, easy to process, flexible yet resistant, and very durable - yet this durability is our major problem. Inadequate collection and disposal of plastics aggravates irresponsible post-consumption behavior and results in unfathomable amounts of plastics finding their ways into the Oceans, harming marine life, affecting tourism, and rising up the food-chain into human bodies. As a result, plastic waste is one of the most urgent challenges of today. Societies must find ways to collect and recycle plastics, leaking less plastic waste into Nature.

PlastiCity, an Interreg2Seas project (2019-2022), investigates the current situation in terms of plastic waste collections and recycling in Ghent, The Hague, Southend-on-Sea and Douai. We describe how different countries and cities operate, where the challenges and constraints are, and what initiatives already exist. New ways for plastic waste collection and transport are presented and recycling scenarios are explored, identifying advantages, potentials, drawbacks, challenges, barriers, and potential ways to overcome them.

The collection logistics account for approximately 80% of all costs associated with waste disposal (Beliën et al., 2012), making collection an essential part of any recycling scenario. Waste collection services are expensive to operate in terms of investment costs (i.e. vehicles fleet), operational costs (i.e. fuel, maintenances) and environmental costs (i.e. emissions, noise and traffic congestions) (Mohajeri and Fallah, 2016). Furthermore, in cities with high population density and high traffic congestion, the non-transportation time, which includes load-unload operations and other idle times, can reach 50% of the total time (Faccio et al., 2011).

Bearing this in mind, we present a suitable scenario for the context, resources and constraints of each city. We take into account their similarities (e.g. handy access to waterways; historical town-centers with narrow streets and restricted access) - as well as their differences in terms of size, organization, ingrained practices, laws and other aspects.

The potential for scaling-up of these small-scale case studies is discussed, and recommendations for the case study cities and other towns are provided. We also flag the political dimension of the problem with lost plastics: there is a lack of enforceable laws and regulations, allowing the recycling industry to operate in opaque and potentially eco-ineffective ways and thereby harming the environment as well as society.

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[*]Speaker

Plastic waste recycling during the pandemic: a qualitative study in four countries.

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Abstract

The pandemic has had a profound effect on most aspects of our lives; waste management and recycling are no exception. We interviewed 24 different stakeholders in the plastics recycling chain (waste collectors, processors, recyclers, councils, etc.) in the UK, The Netherlands, Belgium, and France, to understand the impact of Covid and how people deal with it. Thematic coding was used for the analysis. The main findings include that whilst the crisis led to operational difficulties in the waste management recycling sector, it also offered opportunities for people to change their views on the environment and to gain a better work-life balance. There is no doubt that the situation with plastic recycling (or the lack thereof) was disastrous, and it is still pressing. There were many initiatives attempting to address the problems from various sides, but the increase in incineration and waste-to-landfill suggest they were not successful at a sufficiently large scale.

The pandemic only exposed the structural weaknesses affecting European waste collection systems. Before the pandemics, the literature had already uncovered that policy and logistics failures in the existing systems created perverse incentives for waste companies to incinerate waste or dump it in developing countries. In the four countries studied, COVID-19 exacerbated existing recycling problems through the increased manufacture of single-use plastic items and, at the same time, the temporary suspension of some recycling infrastructure and the disruption of recycling supply chains. All interviews we conducted for this study revealed that there were added challenges to their operations due to the pandemic, and most companies indicated that they had to be innovative and flexible to cope, but the interviews also exposed substantial pre-existing challenges affecting the sector, especially the inability to cope with the impact of single-plastic use. Many also saw the pandemic as an opportunity to do better in the future, to be more sustainable, and re-design waste collection to facilitate recycling.

Key recommendations for the future include improved regulations creating disincentives for single plastic use and more innovative waste logistics for collection and reverse engineering are required to ensure that materials intended for recycling do not end up being dumped into the environment in a developing country. Given the problem induced by low oil prices, leading to virgin plastics being cheaper than recycled materials, it is urgent for legislators to act. It must become mandatory everywhere to use recycled materials in specific minimal percentages. Consumer associations can contribute by putting more pressure on manufacturers and retailers to make and sell products made from recycled materials, as well as to make products repairable by design. Similarly, there needs to be more explicit demand for

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[*]Speaker

locally manufactured products that have not travelled across the globe to reach the consumer. Not all required change will happen voluntarily. A combination of encouraging / incentivising / forcing companies to find alternatives to single-use plastics may be required. . Some single-use plastics will need to remain, but it is necessary to create infrastructure for proper disposal and treatment of these items. Ideally, European countries would take a coordinated approach to both recycling legislation as well as recycling infrastructure. Build more recycling centers acting as regional hubs and change legislation so developed countries are obliged to deal with their own waste; exporting to developing countries must be forbidden. Alternatively, a secure system for tracking what exactly happens to exported waste must be implemented, whereby environmental and social standards are ensured.

PlastiCity: Scenario simulations for collecting plastic waste in Ghent, The Hague, Douai and Southend-on-Sea

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Abstract

PlastiCity, an Interreg2Seas project (2019-2022), investigates the current situation in terms of plastic waste collections and recycling in Ghent, The Hague, Southend-on-Sea and Douai. Having developed a plastic waste collection scenario for each of these cities, we conducted a series of simulations. The scenarios looked at reverse logistic solutions that might fit the four cities from a more abstract perspective; what might be possible in the future? The simulations are more concrete, applying sophisticated software to test scenarios looking at numbers and costs for doing the collections of plastic waste with different vehicles.

In this paper, we develop strategies for reverse logistics related to plastic waste based on desk research, simulations and consultation with waste and logistic companies. Its core is the simulation of (reverse) logistics of (waste) plastics in the case study cities. This results in scenarios with different transport modi, including loading rates, distances, costs, and impact on CO_2 emissions. We compared the use of conventional Refuse Collection Vehicles against electrical vans and CargoBikes, which have the potential to reduce congestion and pollution in cities and are being trialled in various cities (Cairns and Sloman, 2019).

Experience from actors and cases resulted in a generic methodology to develop case specific solutions. This allows transferability to other cities. The more than 100 simulations we run for PlastiCity are a tool to help decision makers and practitioners think about the plastic waste logistics in their cities. They are useful to explore "what if" scenarios and conduct thought experiments. There are however, limitations due to the lack of empirical data from the locations, this specially affecting routes and impact on CO_2 emissions, which depend on the energy mix of each country (Woo, Choi and Ahn, 2017). Nevertheless, we hope this work can serve as a basis for further research and development as well as for practitioners to optimise their local waste logistics in innovative ways.

Keywords: Plastic waste, recycling, logistics, simulations, urban environment

[*]Speaker

Industrial Symbiosis, Industrial Ecology, and Sustainable Supply Chain linkages

Influence of human factors and impact of collective intelligence on performance in the management of industrial construction projects

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Abstract

The technical and organizational complexities and the high demands of the stakeholders combined with the uncertainties and hazards, force the company to fit into a continuous dynamic of seeking high and sustainable performance in order to remain competitive.

The traditional approaches of project management, despite their contributions and advantages, present fewer degrees of freedom to the project manager in terms of agility, inventiveness and creativity. They thus contain limits regarding a holistic management strategy integrating the human, ethical and environmental dimensions, particularly with regard to mega-investment projects.

The complex nature of construction projects requires the coordination of multiple activities between people from disparate cultural backgrounds, whose relationship management is widely recognized as one of the most contributing factors to the failure of construction projects. The collective intelligence can be defined by the intellectual capacity of an organization or a community of individuals to carry out complex tasks by the interactions established between its members and the resulting synergies.

As part of a project, collective intelligence is an organization based on the ability to make a set of diverse and varied profiles work (employees, external collaborators, customers, suppliers) contributing to the same project. Success depends on the quality of the management and the methods used, as well as the many social relations forged internally. This sharing of knowledge, skills and experience has a positive impact on team efficiency and the overall performance of the project team.

Our work aims to study the influence of human factors in the management of industrial construction projects and the development of a hybrid approach to project management, focused on collective intelligence and promoting performance. The study will focus on a portfolio of investment projects carried out in Morocco over the past ten years affecting several sectors of activity.

The approach adopted within the framework of this research includes:

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[*]Speaker

- The description of common project management practices at the national level.
- The review of the state of the performance of the projects carried out at the national level.
- The rate of integration and application of project management standards in the execution of national projects.
- Critical analysis of known standards (PMI, IPMA and PRINCE2) highlighting their advantages and limitations
- Identification of human and behavioral elements that influence the performance of megaprojects
- Interpretation of research results
- The description of the mechanisms of initiation and emergence of collective intelligence in the interaction between the different stakeholders
- The development of a hybrid approach to project management, based on collective intelligence and promoting performance.

How to drive coffee supply chain toward sustainability: a case study in Vietnam

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Abstract

Vietnam is the world's second-largest coffee grower and exporter, as well as Asia's top exporter of Robusta coffee. However, the Vietnam coffee industry is confronted with huge issues since current agricultural farming and processing facilities are unsustainable, resulting in several negative environmental consequences such as deforestation and soil degradation. As a consequence, these issues have reduced coffee output and quality, threatening the competitiveness of Vietnamese coffee products. Furthermore, ensuring the sustainability of coffee growth is critical in developing rural regions in Vietnam, which will ultimately contribute to the overall economic stability of the nation. Growers, manufacturers, policymakers, and customers all around the world have paid significant attention to sustainable agriculture recently. Based on the literature review, moving toward sustainability is critical for the Vietnamese coffee industry to maintain stable output, manage natural resources sustainably, and increase profits. Moreover, understanding the determinants that impact the adoption of sustainable practices has been a long-standing concern in agribusiness management studies. According to previous studies, the percentage of Vietnamese coffee that is grown sustainably is quite small, less than 10 %. Although sustainability is regarded as a critical competitive priority, few researchers have studied the sustainable coffee supply chain in Vietnam. Therefore, the purpose of our paper is to investigate the primary factors that influence the decisions of key stakeholders to adopt sustainable practices.

Prior study has identified three categories of behavioral factors that affect decision-making: dispositional, social, and cognitive (see Figure 1). Dispositional factors consist of personality, resistance to change, risk tolerance, moral concern, environmental concern, and objectives. Social norms and signaling motives are the main elements of social factors. Cognitive factors include knowledge, perceived control, perceived costs and benefits, and perceived risks. The novelty of our research is to focus on key processes of supply chain management including procurement, warehouse, production, and distribution. Figure 2 explains the model framework. The data is collected via a comprehensive survey of key stakeholders of the coffee

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[*]Speaker

supply chain in Vietnam including farmers and coffee companies. To better understand supply chain participants' decision-making process, a questionnaire survey describing behavioral factors is utilized and scored on five-point Likert scales ranging from strongly disagree (1) to strongly agree (5). Each construct's items are collected from earlier studies on related topics. The collected data will next be examined using structural equation modeling, which is appropriate for exploratory research to determine major constructs.

As a result, this paper presents an overview of farmers' and companies' perspectives on adopting sustainable agricultural production. This research investigates the current circumstances of sustainable behaviors of key stakeholders of the coffee supply chain in Vietnam. Based on the findings, we will explore the factors that influence supply chain participants' behavioral intentions toward sustainable practices. Then, we recommend appropriate measures for promoting the sustainability of the Vietnamese coffee supply.

Ecological DDMRP buffer positioning with supplier selection

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Abstract

The supply chain world is having a new era. A set of complex constraints and rigorous policies are governing how it works. Industrials and decision makers are in a continuous need for tools and methods to help them make the right decisions in the most sustainable way. Client satisfaction and cost minimization remain as the main objectives of a good operational optimization. In addition to the carbon footprint reduction that raised as a major concern to shift to a more ecological and durable mode of production. In this research work, we look into the strategic level of the supply chain for a better scope of the applications of the Demand Driven Material Requirements Planning (DDMRP). To do so, a multi-criteria decision analysis was conducted to investigate the different aspects of cost, delivery time and carbon emissions. As a result, an optimization model is developed to get the best inventory positioning along the bill of materials (BOM) of a certain product in terms of costs and under the constraint of service time and carbon emissions. This optimal positioning choice takes in consideration every possible supplier regarding their delivery time and outsourced material cost, to give as an additional output the optimal suppliers selection and its corresponding order quantities. The emissions are considered mainly due to warehousing and transportation activities. Two ecological strategies are considered for this work and simulated simultaneously with the model: carbon emissions tax and carbon emissions cap limitation. The model is resolved using constraints programming optimizer and a pseudo linearization version is introduced for a resolution using Cplex solver. The tests included various BOM complexity levels. This study gives a better understanding of the multi-criteria aspect of the inventory positioning problem, and how sensible is the supply chain planning to the various decisions made according to the DDMRP framework.

Keywords: DDMRP, Inventory, transport, supplier selection, carbon emissions

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[*]Speaker

Environmental impacts of the Collaborative Intelligent Transport Systems (C-ITS): survey and research directions

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Abstract

The awareness of the climate emergency makes environmental issues a priority at many levels. In addition to political initiatives, research on the reduction of the environmental impact of human activities is on the rise. Among these activities, the transportation sector is among the most polluting. In parallel to the efforts to electrify vehicles, many works are focusing on the reduction of gaseous pollution of thermal engines. In addition, a significant amount of research is being done on the automation of vehicle driving. Thus, the suppression of the human factor can lead to an enhancement of road safety, an improvement in comfort as well as a better energetic performance. This enhanced efficiency translates into reduced fuel consumption. However, before reaching a fully autonomous vehicle, and considering the great complexity of such task, many intermediate steps must be taken. Thus, Connected Vehicles (CV), coupled with connected infrastructures, allow the emergence of Collaborative Intelligent Transport Systems (C-ITS). The CVs allow a large number of promising perspectives. In this article, the focus is on reducing the environmental footprint through C-ITS. The survey of the various contributions from the literature, highlights the possibilities offered by such technologies. Indeed, the following question is explored: how can these different C-ITS technologies help to optimize fuel consumption? Many works have shown that fuel consumption and CO2 emissions can be described as functions of speed. Some applications, like the Green Light Optimized Speed Advisory (GLOSA), allow regulating the speed of the vehicle. With the development of technologies like the Internet of Things (IoT) and its entry into vehicles, new applications to reduce the environmental impact of transportation are made possible. A review of the literature allows understanding all the new possibilities offered, as well as the research trends that are emerging.

Keywords: C, ITS, CO2 Emissions, Sustainability, Freight, Logistics

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[*]Speaker

Long range heat alternative planning- developing hydrogen economy

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Abstract

The idea is contributed to developing a model to predict the impact of the application of hydrogen on the growth of electrification in the residential sector. The motivation for creating the platform is referred to develop the hydrogen economy at any price.
The idea has three phases;

- Discovering drivers of human behavior on consuming energy in the residential buildings
- Exploring the possible changes in future peak hour price of electricity because of increasing the share of intermittent energy sources
- Investigating how hydrogen could contribute to supporting the expected demand.

The main goal is to explore how hydrogen could affect the growth of electrification in the residential sector.

The biggest challenge to developing the hydrogen economy is the cost of production of hydrogen compared to available energy carriers. Moreover, in the transition discussion, there are two main debates, who should first pay; the Government or the public, and what the contribution of each part is.

The idea consists of two parts; first, it is discussed how hydrogen should be applied in the energy system. An analogy has been found to explain what the penetration of hydrogen should look like.

The applied analogy is about the spreading smartness aspect of phone, which was designed to enhance the digitalization as a macro target.

In the second part, it is targeted to discuss what would be the requirements to increase the application of hydrogen, what types of changes are needed.
The output is a platform, which is used to predict how the hydrogen economy in each region, regarding the human properties and the local limitations and potentials, could be developed. The shareholder of this platform are policymakers, the utility provider companies, and energy supplier companies.

Keywords: consuming energy, hydrogen economy, planning

*Speaker

Circular Economy via relevant Logistics with the help of new technologies

Lochem Energy's development of Hydrogen Economy: seeking for research funding

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Abstract

Lochem Energy(2) (LE) U.A. is an energy cooperation from and for civilians of the city of Lochem in the East of the Netherlands. LE is established in 2011 and is seen as a leading partner in the ongoing regional energy transition, recognised for such merit as one of the top 100 Dutch sustainable organisations.

LE sees the development of the hydrogen economy as an opportunity to lead and facilitate the energy transition. LE has already supported Alliander company (energy distribution organisation) in their endeavours towards energy transition. Alliander's efforts have resulted on the establishment of community houses in Lochem that went off the natural gas grid and currently use Hydrogen for heating.

In line with this innovation LE is now looking at the possibilities to facilitate local industry, in particular fleet owners, in finding ways to support their energy transition goals. In particular, LE has interest in the transition to the use of Hydrogen as fuel for trucks and cars. Lochem is ideally located to facilitate shipping transport due to its vicinity to the Twente Canal.

All in all, LE has the goal to enable the energy transition in the mobility sector, hence, further research is necessary to answering questions such as: how much can the Hydrogen energy economy contribute to the CO2 emission balance? To answer this question, Lochem Energy is looking for research funding because we believe we can deliver a show case with high roll-out potential.

Keywords: Hydrogen economy, energy transition, The Netherlands

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[*]Speaker

Circular economy strategy for sustainable parking management

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Abstract

In recent years, the circular economy principles have been implemented in a wide range of domains, including transportation and mobility. The circular economy idea basically promotes reducing the environmental impact on society. The key to the circular economy's success is sustainability. For the transportation domain, sustainability is also applicable to the optimization of the parking lot infrastructure at the city level. However, "how can parking management benefit from a circular economy strategy?" is an actual question.

In urban areas, drivers experience difficulties finding an available parking space every day. This results from a blind and exhaustive search for an available parking spot and obviously causes a rise in gas emissions and air pollution in the city. Considering the parking lot usage extracted from parking occupancy datasets, it is possible to exploit daily or even yearly parking history to improve parking services. Moreover, such datasets can be used to develop parking occupancy forecasting models to assist drivers. They can also be combined with additional information such as the list of amenities surrounding the parking lots in order to get a better understanding of how parking occupancy evolves over time and identify the major factors influencing it.

The main objective of applying circular economy principles to parking management is to commit to a more sustainable approach. We indeed design machine learning models that provide short-term forecasts of parking occupancy and observe all potential factors influencing the accuracy of the forecast such as the related facilities, the hour of the day, or the events occurring in the city (e.g., accidents, rain, etc.). Parking transactions can be used to characterize the parking facility usage. The exploitation of city-level parking occupancy forecasting models may provide several contributions to drivers and parking managers, such as better parking management and policies, or actual assistance for drivers to quickly find a free parking spot while they are driving towards their destination. Reducing the distance traveled by vehicles will obviously reduce energy consumption as well as pollution. Besides, the forecasting tools considered here can be used for different purposes or vehicle types. For

*Speaker

instance, mapping the charging facilities for electric vehicles, to adapt to future mobility, including cleaning and maintenance areas within parking lots will improve the driver's experience. It is incredibly handy to be able to park the car and clean it at the same location. Finally, incorporating the circular economy into the parking lot regulation allows for the design of more efficient, environmentally friendly, and sustainable parking lot management.

Current Development and Potential Applications of Blockchain Technology in Supply Chain - A Systematic Literature Review

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Abstract

Blockchain is a type of Distributed Ledger Technology (DLT) which refers to the infrastructure and protocols that allows recording transactions with an immutable cryptographic signature. It allows storing and transmitting information across a network with multiple entities in a transparent and secure manner and operates without a central control body. The technology was first developed for the Bitcoin cryptocurrency, but it has more applications today. Its craze has piqued the curiosity of several banking and information technology companies, who sought other uses for blockchain. And today, blockchain is touted as a solution that can improve supply chains, and insurance contracts, among others.

In this study, we examine the current status and potential applications for blockchain technology in supply chain management. A literature review, including an analysis of all related blockchain and supply chain research, was conducted to better understand the trajectory of relevant notions and suggest trends. We focus on papers that have covered the use of blockchain for managing transactions and information exchange within supply chains.

The study aims to assess the maturity of blockchain and DLT technologies application within logistics and supply chains, namely the type of blockchain, techniques, frameworks, usage, implementations, and challenges. This should help identify potential benefits and issues that could profit from further studies. The idea is also to highlight and identify specific challenges, issues, barriers, inconsistencies, and research gaps to lead the way for future development and innovation. We have selected blockchain and supply chain related articles from Scopus research database and we classified them by topic and keywords. The aim of this classification is to identify the topics that need more attention.

Keywords: Blockchain, supply chain, systematic literature review, logistics.

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*Speaker

Impact of demand forecasting on performance of sustainable coffee supply chain in Vietnam

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Abstract

Sustainable growth for the agricultural supply chain is widely discussed nowadays. Companies must efficiently have included environmental concerns and sustainable practices in their daily business operations, particularly logistics and supply chain activities, in response to strict laws and growing customer awareness. Big data technology has the potential to increase efficiency and quality in the coffee supply chain from upstream to downstream, moving it toward sustainable growth. As a result, big data technology can boost the performance of the coffee supply chain in the long term. Moreover, recent research indicates that using advanced demand forecasting helps to enhance coffee supply chain performance by accurately predicting future demands and consumer satisfaction. However, there is a lack of evidence of the extent and magnitude of savings as supply chain performance results, especially in sustainable supply chains. Therefore, our paper aims to investigate the relationship between demand forecasting and the performance of a sustainable coffee supply chain.

Although sustainability performance management is an important component of performance management, it has gained little scientific attention. There are different opinions on how to evaluate the performance of a sustainable supply chain. Thus, the conceptual framework for measuring the sustainable supply chain will be proposed in this article. According to World Commission on Environment and Development, sustainability is interpreted as the capability to fulfill current demands without compromising the ability of future generations to meet their needs. Based on the literature review, sustainability in a supply chain encompasses economic, social, and environmental elements (see Figure 1). True sustainability happens at the intersection of all three elements. The performance of a sustainable coffee supply chain will be assessed using many indicators which will be divided into three components of sustainability. These metrics will be collected from previous studies on related issues. In addition, metrics will be selected if they can be generated using demand forecasting data.

Based on the literature review, machine learning has achieved a lot of success in recent decades. Because machine learning algorithms work well with complicated data and non-linear trends, they can produce more accurate demand forecasts. Moreover, coffee data contain various temporal variations and trend shifts, making accurate predictions difficult. Therefore, this research selects several famous forecasting methods such as Support Vector

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[*]Speaker

Regression (SVR), Artificial Neural Network (ANN), Recurrent Neural Network (RNN), and Long Short-Term Memory (LSTM). Using a case study of coffee in Vietnam, we will compare the impact of the machine learning methods on sustainable supply chain performance.

Figure 2 illustrates the main steps of the paper in order to achieve our purpose. This study will highlight the advantages of using machine learning forecasting to improve the supply chain performance of a sustainable supply chain. Our findings provide more empirical evidence on the effectiveness of employing machine learning for demand forecasting. The analysis will show which forecasting model has the most impact and which sustainability component will be most impacted. This research would provide a better comprehensive into the indicators that are being used in practice and would serve as a reference for researchers interested in measuring the performance of sustainability in agricultural supply chains.

Optimization of the level of Circularity in the building sector: A case study in Dutch building

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Abstract

The building sector accounts for 38% of all energy-related CO2 emissions (UNDP), 42% of total energy, and 30% of the waste products in European countries. Therefore, the transition to a circular economy in the building sector is, therefore, one of the important challenges today. It helps minimize the use of virgin material, make use of multiple cycles and ensure that buildings, components, products, or materials last as long as possible in one or more cycles. Several circularity design strategies exist to reduce the consumption of natural resources and minimize the production of waste. To understand the potentiality to improve circularity in current building design, it is important to measure the level of circularity (LoC) in the circular project. Therefore, the research question of this study is: How to optimize the level of circularity in the building sector?. Using design-orientated research, the design of the one-family Dutch house was altered to gradually increase its Level of Circularity. The circular building design scenarios were developed by considering the impact that the use of alternatives (reuse, recycled, biological or demountable) materials would have on the circularity level. Building Circularity Indicators (BCI) were used to assess the level of circularity in this study. The result shows the use of biological material and recycled material with design for disassembly strategies in different layers of the building increases the level of circularity by 67%. The result also shows that the structure of the building has a high impact on circularity.

Keywords: Level of circularity, circular design strategies, Building Circularity Indicator, circular building

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[*]Speaker

New Circular Economy Business Models

Where are we in decarbonizing industrial logistics? Preliminary results from a survey among practitioners

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Abstract

For many years, researchers propose that, besides economic factors, the consideration of environmental and social impacts of business practices must be considered to ensure the long-term survival of companies, humans, and ecosystems. In the last years, those calls start to reach practitioners among all industries, especially regarding the reduction of Greenhouse Gas Emissions due to tighter regulations regarding carbon emissions and more conscious buying behavior of customers. Looking at the economic sectors that emit most carbon emissions and thus have the biggest lever and motivation to reduce emissions, industry and transport stand out, emitting 29% and 14% of global carbon emissions, respectively (Ritchie and Roser, 2020). Investigating the cross-sectoral relationships of those two sectors is the task of researchers in the field of industrial logistics, which are concerned with planning, implementing, controlling, and optimizing materials flows and their associated information flows that emerge throughout the operations of manufacturing companies, including inhouse material handling, as well as in- and outbound transportation. In contrast to production or the design of products, measures to reduce emissions in those logistics activities are not yet achieving their expected effects (Lopes de Sousa Jabbour *et al.*, 2020), which is a phenomenon that is not yet fully understood.

To investigate this in more detail and present an overview of the state-of-the-art in decarbonizing industrial logistics, we created a survey that covers two main parts: a first one querying general facts about how companies approach Green Logistics, and a second one querying eleven specific measures that can be implemented by firms to green logistics. Thereof, we defined the variables 'Establishment' of green logistics in the company, which incorporates four different indicators from the first part of the survey, and 'Implementation' of measures, which incorporates the degree of implementation of measures from the second part of the survey. Preliminary results show a significant and strong positive correlation between the two variables as well as a generally low degree of establishment among companies, which provides one explanation for merely adopted practices. Furthermore, a experts relate high barriers and low potentials to specific measures. In combination with the finding that the perception of measures and their expected reduction potentials are a crucial factor that drives the willingness to adopt those measures (Pålsson and Johansson, 2016), this provides another stream of explanation. To further discuss the state-of-the-art and provide sound statements, more data is necessary, which is why the results must be taken with caution and are only of preliminary nature.

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[*]Speaker

Further research should compare the empirically collected perceived potentials and barriers of the measures with results from other scientific studies, such as simulations or case studies, in order to reveal a possibly distorted perception of the practitioners.

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Keywords: Decarbonizing, green logistics

Automotive Industry Textile recycling: a study and industrial application

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Abstract

Recycling is a process for treating waste, which makes it possible to reintroduce certain materials in the production of new products. In our project, the expected benefits are the reduction of the cost of textile waste resulting from the manufacture of automobile fairings (covers) by the implementation of recycling processes in order to secure the supply of raw materials to the industry and to reduce the environmental impact. The latter, is forecasted to be huge if we consider the actual automotive energy transition from gazoil to electrical and hydrogen. This transition will induce an important renewing rate of automotive park worldwide.

In our study, we grouped textile waste into the following families:

• The Laminated fabric is an assembly of at least two layers which consists of polyester/polyamide (fabric, weave...), non-woven (fibre mixture) or polyurethane (PU foam), which are bonded either by heat sealing or by adding an adhesive which makes them inseparable.

• Non-woven fabric whose polyester fibers are randomly arranged and consolidated by adhesive or under temperature conditions adapted to the time of its manufacture.

• Flexible polyurethane foam alone or laminated to seat fabric.

The proposed recycling processes contains two phases :

- Delamination of the textile either by Chemical, Mechanical: Or Thermal actions
- recovery of the fibers by the different delamination operations and direction to feed a nonwoven production line.

As a result, we developped products that are possible to manufacture such as: Car mats, Geotextile, Combustible insulation panels...

Keywords: Recycling, Waste, Textile, Automotive, manufacturing, environnemental impact.

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*Speaker

Multi-agent Multi-objective Q-learning rescheduling approach for energy efficient Flexible Job Shop Problem

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Abstract

Energy consumption control is a growing concern in all industrial sectors. Controlling the energy consumption and realizing energy saving are the goals of many manufacturing enterprises. To implement such measures, researchers focused on developing more energy-efficient scheduling approaches to make a balance between energy consumption and system stability. In addition to that the manufacturing production environment is dynamic in which several perturbations can arise, these makes the scheduling process much more difficult. Recently many researchers have designed reactive and robust rescheduling approaches using artificial intelligence, these learning-based approaches gain the knowledge of the manufacturing system to be used in the decision-making process. In this work, an energy efficient multi-agent rescheduling approach is proposed to handle machine failures, energy variation and new job arrivals. The energy consumption reduction is integrated in the predictive and reactive phases of the distributed approach. Agents behaviors are based on genetic algorithm and multi-objective Q-learning algorithm. In order to assess the performance of the proposed approach, an extended version of Brandimarte's benchmark are tested. Results proved the efficiency and the effectiveness of the proposed approach.

Keywords: rescheduling, energy consumption, FJSP, breakdown, Qlearning, Multi, agent system

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[*]Speaker

An effective Multi agent model for the Multi Plant Multi Product Inventory control Problem in Physical Internet Supply Chain Network

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Abstract

Promoting sustainability of the integrated production-inventory-distribution system is a very big concern. Recently, the Physical Internet (PI) was introduced as a new paradigm to improve the global logistics performance economically, environmentally and socially. Physical Internet is defined as an open global logistics system with hyperconnected components. The problem addressed in this work concerns inventory control. A model of a Physical Internet supply chain consisting of n production facilities producing multiple products is considered. It is an NP-hard problem based on the fact that a multi-plant inventory problem can be decomposed into m single plant inventory problems. In order to deal with the possible perturbations that can arise along the process of delivery, a mixed integer linear programming model (MILP) and a multi agent system (MAS) are proposed. The MILP has been used as a reference model that provides optimal solutions to be compared with the solutions provided by the MAS model. The economic and environmental objectives are measured through the total holding, transportation costs and CO_2 emissions, respectively. A set of experiments have been performed, using several randomly generated instances. Results prove the efficiency of the MAS in terms of inventory and transportation costs loss, and demonstrates the reactivity of the MAS under PI-hub perturbations

Keywords: Physical Internet, Inventory Control, Replenishment's source selection, Multi agent system, MILP, PI, hub Perturbations

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[*]Speaker

Management of maintenance operations: Preventive visits

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Abstract

With the extension and modernization of Moroccan urban rail networks, maintenance centers encounter new challenges, both technical and organizational, to guarantee the operator a contractual availability of more than 90% for the entire fleet as well as safety and security conditions for users.

The tram maintenance center provides rolling stock maintenance services and has:

- A storage area for parking the entire fleet of rolling stock under a covered area.

- Washing workshops to clean the outside of the trams

- The maintenance hall workshops which include several platforms, side and central pits, fixed and mobile platforms and walkways, workstations, lifting equipment, voltage taps, dedicated pneumatic and electrical means, simulators speed thresholds, pressure control tools, etc.

- The service stations dedicated to filling the sandpits, washing the windows and carrying out technical checks.

- Work areas intended for the maintenance of bogies and other equipment which are removed from the trams as well as the machines intended to reprofile the wheels of a tram, in case of deformation.

Therefore, the maintenance of the rolling stock depends on its usage. Indeed, depending on the distance traveled by each train belonging to the rolling stock fleet, the manufacturers recommend more than 10 standard types of preventive inspections. These preventive visits are planned with a tolerance interval based on the distance traveled by each train according to a maintenance plan.

Each preventive visit standard is described in an operating range with workloads ranging from 20 to 600 hours including operations such as immobilization/preparation of the train, isolation of batteries, locking and unlocking of systems, loading/unloading of programs, initialization on-board software, visual inspections, level or height adjustments, functional checks on coupled and uncoupled trains, oil level checks, wear limit, manoeuvrability, positioning, etc. engine monitoring , draining the oil pan, checking inflation and sealing, changing filters, replacing blocks, etc.

For each preventive visit standard, we have identified several constraints such as precedence constraints, release date or due date type constraints, resource and capacity limitation

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[*]Speaker

constraints in the work areas, skill constraints in the allocation of human resources and other constraints classed as EHS.

These are additive operations (which are not included in the operating range) to be added to the operating range prior to certain operations that present an EHS risk. This may involve a markup of an area, a consignment procedure, verification of protective equipment, authorizations, work permits... An EHS constraint can also involve the assignment of more than operators than what is planned in the operating range when there is a risk of people or objects falling, or risks of accidents, etc.

To summarize, for each preventive visit, we treat a new extension of the RCPSP problem of project management under constraints.

The unpredictability of certain operations of preventive visits and the specificities of the functioning of the center and the shared resources of the center with other activities, pushed us to be also interested in a set of problems in the literature such as Production planning of maintenance, scheduling of maintenance personnel (Duffuaa et al. 1999), task insertion (Hammami et al., 2003), industrial maintenance management (Esveld 2001), (Adzakpa et al. 2003) (Budai et al. 2006), and the Preventive Maintenance Scheduling Problem (PMSP) (Budai et al. (2006)) and (Budai 2009), ...

Analytical possibilities and solutions for the Circular Economy

Bi-objective Approach for Sustainable Reverse Routing Problem

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Abstract

The recycling and reuse of wastes are important ways to ensure an effective circular economy (CE). Indeed, they play a crucial role in resource management and environmental protection. In the context of CE, the problem of collecting recyclable end-of-life goods for further processing has received considerable attention by research communities in recent years. This is especially true in the present international contexts (climate changes, wars, humanitarian and sanitary crises, materials and energy shortages,...). In this research, we are especially interested in collecting recyclable waste from final consumers to collection centers. Indeed, a fleet of homogeneous vehicles start from the collection center and visiting a set of geographical dispersed customers within predefined time windows. Then, at the end of the working day, each vehicle must return to the collection center. The studied problem is modeled as bi-objective green vehicle routing problem with reverse logistics (Bi-GVRPRL) with the aim of optimizing total traveling cost and CO_2 emissions. To solve the investigated problem, we developed a VNS based approach with several neighborhood structures. An experimental study is conducted, based on Solomon's 56 benchmarks. The proposed approach is tested on different instances with mono-objective as well as with bi-objective formulation. The obtained results show that our proposal performs well and is highly competitive compared with the state-of-the-art meta-heuristics.

Keywords: Green Transportation, Reverse Logistic, Circular Economy, Bi, objective Optimization

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[*]Speaker

PROFITABLE INVESTMENT OPPORTUNITIES FOR CIRCULAR SMART FOOD MARKETS IN KENYA

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Abstract

Introduction

Open-air food markets in Kenya are currently dilapidated despite being a crucial component of food market systems and serving approximately 77 percent of the entire population. Smart Markets reimagines open-air food markets with components such as solar mini grids, cold storage, mini-processing, sustainable waste management systems, e-mobility, digital payments, smart buildings among others hence more safe, hygienic, efficient, resilient and eco-friendly for all market stakeholders amplifying their economic opportunities. Provision of smart solutions that enable reuse, recycling and upcycling of products in and outside of food markets indicates that Smart Markets are an integral part of Circular Economy with not only profitable investments opportunities but financially sustainable business models as well. Operation models dependant on each markets needs and budget are pertinent and should be considered to build and sustainable manage and operate markets.

Key words: Smart Markets. Circular Models. Profitable Investment

Objectives

- To critically review existing literature and case studies on smart market solutions as integral part of circular economy
- To identify financially viability of circular business models for the identified smart market solutions in Kenya.
- To evaluate smart circular markets as profitable investment opportunities in Kenya.

Methodology

A detailed and empirically rich multi-case study method will be used to exhaustively address the research objectives. An in-depth literature review and case study analysis will be conducted to inform the relationship between smart markets and circularity. The Minimum Viable Product approach will be used in the evaluation of the various proposed Smart Markets Circular Business Models. This will be an iterative and parallel process entailing data analysis based on a theoretical or analytical framework. Findings will be shared during the ARISE-GIN Symposium 2022.

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[*]Speaker

Results

Study results will then be compiled considering ongoing feedback. This will culminate in a publication as part of a special issue in a scientific journal.

Conclusions
This paper will critically evaluate the available smart markets circular business models as profitable investment opportunities in Kenya

Keywords: Smart Markets. Circular Models. Profitable Investment

Eco-system of recycling in Morocco: Study of the Feasibility in the automotive industry

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Abstract

The circular economy is an alternative to a traditional linear economy (manufacturing, use, disposal) in which we maintain the resources in service as as long as possible, by extracting the maximum value from them when using them, recovering and reusing products and materials.

In this context, and following the example of this work in Euroe, the cited industrial group group is mobilizing its efforts to implement a circular economy strategy in Morocco, aimed at reducing the use of fossil resources and the carbon imact and be a cursor of change.

As in other regions, In Morocco the automotive group has launched actions in collaborations with several actors (Equiment manufacturers, material suppliers, etc.) in order to identify new solutions that can be used and operated locally, to integrate recycled materials in parts produced in Morocco.

The paper is a research work that studies the feasibility creating of a recycling ecosystem in Morocco. Supported by an automotive group, this work objective is implementing a circular economy strategy in Morocco, aiming at reducing the use of fossil resources and the carbon imact and be a cursor of change.

In the first axis of the project, we will present an analysis of the state of the market of recycling in Morocco and highlight the important figures of waste generated annually, this axis is supported by a case study on the automotive industry waste. The second axis is devoted to the benchmarking of recycling models that will be the subject of recycling ecosystem roosition for the various sectors.

Keywords: Recycling, circular economy, waste management, automotive, eco, system

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[*]Speaker

Implementing Industry 4.0 technologies for sustainable change to achieve sustainability goals in supply chains

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Abstract

The implementation of Industry 4.0 technology in supply chains has received increasing academic and corporate attention in the last period (Kamble et al., 2018). This movement is a result of rapid global changes, increasing sustainability challenges, and policy pressure. To address the sustainability challenge, the UN 2030 Agenda represents an interconnected strategy for businesses to develop solutions and implement sustainability practices at the core of their processes (Dantas et al., 2021).

Industry 4.0 technologies are driving a new kind of progress in supply chains by transforming their model from a linear design to an integrated ecosystem known as Supply Chain 4.0, where collaboration and coordination among stakeholders are important elements of the chain's operation (Frazzon et al., 2019).

In this research, we argue that Industry 4.0 technologies are key assets in contributing to sustainability at the SCOR model processes in supply chains and, therefore, in achieving the Sustainable Development Goals (SDGs). We link technology attributes and capabilities to process operations, to drive new sustainability practices that ultimately achieve the SDGs.

Therefore, the problematic of this research is twofold. On the one hand, to understand the complexity of redesigning supply chains under the impact of Industry 4.0 technologies and, on the other hand, to determine the potential of new digital technologies in driving sustainability performance in SCOR processes and across a set of SDGs.

This paper aims to contribute to the literature and investigate the interplay between ecological, social, and economic dimensions in a Supply Chain 4.0.

The study acts in an emerging topic and draws a framework from the literature that represents the potential outcomes of implementing technology in supply chain processes. The primary outcome is to uncover new forms of capabilities within the SCOR model in a Supply Chain 4.0 that are likely to drive sustainability performance and achieve the 17 SDGs.

The study shows that Supply Chain 4.0 is characterized by transparency, real-time capability, agility, interconnectivity, and decentralization, leading to multiple sustainable outcomes,

including increased profits, natural resource and waste management, worker safety, achieving a closed-loop supply chain, and other sustainability benefits.

The framework can be applied as a guideline for academics and practitioners to achieve sustainability performance. Managers will recognize the role of modern technologies such as Blockchain, Internet of Things, artificial intelligence, robotics, etc., that have significant implications for their sustainability plans.

In addition, the study can potentially draw on data generated from the ESG database and be tested by a panel of experts to provide practical justification and evidence for the implementation of the framework.

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Circular Economy of Electronics: Promoting Sustainable Development Through Reverse Logistics

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Abstract

The emphasis on economic results neglected possible socio-environmental issues, generating the over-exploitation of natural resources. The Triple-Botton-Line (TBL) approach arises from the concern for the planet, without forgetting people and the generation of profit for organizations, contemplating the environmental, social, and economic dimensions. Environmental practices are implemented to minimize impacts so that natural resources are not extinct. We highlight Reverse Logistics (RL), which focuses on proper product disposal. RL is considered a competitive advantage for organizations in their customers' perception and increases organizations' efficiency and competitiveness. We expanded the search for the convergence of concepts, highlighting the circular economy (CE) as a new paradigm. CE is seen as a path to sustainability, presenting a counterforce to the conventional linear take-make-dispose model seen in much of the modern economy.

A CE aims to promote value creation from the generation of waste. The literature shows that culture is still a barrier to CE promotion. According to Ghisellini, Cialani & Ulgiati (2016), CE is a business model that leads society to more sustainable development, simultaneously balancing economic, environmental, and social aspects. CE is more than a preventive approach; it is also regenerative. According to Stahel (2016), at the end of its lifespan, the consumer good is reintroduced as a resource in a new production chain, closing the product life cycle and minimizing waste generation. One of the main criticisms directed at CE is the lack of social dimension, essential to the concept of sustainability (Geissdoerfer et al., 2017). The participation of the social dimension in the CE is considered peripheral and insufficient, making it one of the biggest challenges for the transition to a CE (Homrich et al., 2018).

From the analysis of reverse logistics of electronics, the paper aims to answer how can the CE contribute to the social pillar of sustainable development? This is a qualitative and descriptive research approach through a single case study. A semi-structured in- depth interview was conducted. observation and on-site visits made it possible to triangulate the data. The electronics RL is performed by a company that recycles, repairs, and reuses. Everything is dismantled, and all components are separated after recycling and repaired for use in new computers that are reassembled for reuse. When these computers are donated to third sector institutions, it is possible to contemplate the social pillar of sustainable development.

The CE is a strategic instrument both for cost reduction and for the gain of corporate image, considering itself an important competitive advantage instrument. Although these

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*Speaker

contributions are relevant, there are opportunities for further research, especially regarding the cultural aspects and the understanding that RL effectively integrates the CE concept.

Energy flow analysis in production facilities to increase energy efficiency and reduce greenhouse gas emissions of SMEs: A case study

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Abstract

With the industry sector being one of the main energy consumers worldwide, the topic of energy efficiency is becoming increasingly vital for manufacturing companies in order to cope with the challenges of rising energy prices, statutory requirements, and even changing customer requirements towards greener products. This is particularly true for small and medium-sized enterprises (SMEs), as they not only represent a significant proportion of European companies, but also often lack the required know-how or financial and human resources to implement measures aimed at reducing the energy consumption. To counteract this problem, energy flow analyses offer a suitable approach, as they provide a basis for action by identifying optimizable energy flows, and thus to reduce energy consumption and related energy costs. However, these methodologies are primarily used in large or energy-intensive industries in which single processes are considered in more detail. Within the scope of this work, a single case study in an SME located in Slovenia was conducted holistically to not only reduce the energy consumption but also the related greenhouse gas emissions. The holistic analysis of the production facility shows that a reduction of identified losses of 910,000 kWh/year (representing 44% of the total losses) is potentially achievable resulting in a reduction of the emissions by around 258 tCO2eq/year (reduction by 11%). The achievable annual cost savings amount to over 38,000 € (13% of total energy costs) whereby the majority of the measures showing amortization periods of less than three years.

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