4TH INTERNATIONAL CONFERENCE ON QUALITY INNOVATION AND SUSTAINABILITY

22nd and 23rd May 2023

BOOK OF ABSTRACTS

IPS **ESCE**

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Introduction

The 4ᵗʰ International Conference on Quality Innovation and Sustainability (ICQIS) is organized at the Polytechnic Institute of Setubal, Portugal, between 22–23 May 2023. The ICQIS Conferences have been a meeting forum for researchers and interested professionals on Quality Innovation, with a special focus on Sustainability. Thus, the ICQIS23 aims to foster an inclusive environment to offer to all participants a unique opportunity to connect, collaborate, exchange innovative ideas, and showcase their groundbreaking research to a global audience. Over the course of the last three years, the host universities of ICQIS have played a pivotal role in uniting scientists with the fundamental principles of Quality Innovation and Sustainability. ICQIS is also establishing a new tradition, laying the groundwork for the convergence of master and doctoral students in Quality Innovation and Sustainability with researchers, professionals, and academics from various corners of the world.

The fourth edition includes two keynote speakers, a round table with the theme "Innovation and Sustainability" and five parallel sessions where 25 papers are presented, as detailed in the Program.

This book presents the Committees, the Conference Program and the Abstracts of the papers accepted for presentation in the conference. The full papers will be published in a Book of Springer Proceedings in Business and Economics.

Conference Program

Time	Day 1 – 22nd May
09:30	Conference Registration
10:00	Opening Cerimony
10:30	**Round Table** "*Innovation and Sustainability*" Moderator: Cindy Barardo - Communication - Women in Tech Portugal • José Pratas - Head of Innovation & Partnerships - CGI • Pedro Dominguinhos - President of the PRR National Monitoring Comittee • Pedro Lago - Sustainability Projects Director - Sonae MC • Vitor Caldeirinha - Business and Logistics Director - Port of Setúbal
12:00	Q&A
12:30	Lunch - IPS' Restaurant
14:00	**Keynote Speaker** Matevž Obrecht (University of Maribor) "*Sustainable Mobility*"
15:00	**Parallel Sessions I – Session 1** | *Moderator: Luís Barreto* Innovations in higher education institutions (HEIs) towards smart and sustainable future: A study on EUDRES *Agita Livina and Gavinolla Mahender, Vidzeme University of Applied Sciences* Adaptation of Portuguese agricultural Small and Medium-sized Enterprises to digital platforms *José Carlos Ferreira Correia, Instituto Politécnico de Setúbal* A comparative study of Service Quality in Portuguese and Angolan Higher Education Institutions *Ana Rolo, Instituto Politécnico de Setúbal* An optimization model for the selection of renovation actions in a building, *Teresa Pereira, Instituto Superior de Engenharia do Porto* Adoption of Electronic Commerce by Portuguese Small and Medium-Sized Enterprises *José Carlos Ferreira Correia, Instituto Politécnico de Setúbal*

15:00	**Parallel Sessions I – Session 2** | *Moderator: Sandrina B. Moreira* When we associate innovation to management and apply it to national parks. Case of Huascarán National Park Peru *Ikrame Selkani, Cesine International Business School* Enhancing Tourism through Local Development Strategies (LDSs): A Study of FLAG Marche Sud Area *Federica Murmura, University of Urbino Carlo Bo* Erasmus+ 2021-2027 in Higher Education: Contributions to the 2030 Agenda and the Sustainable Development Goals *Teresa Nogueiro, Universidade de Évora* Exploring the Potential Contribution of Blockchain Technology to Sustainability Reporting *Veysel Akman, University of Warsaw* Applying the concept of sustainable new product development in digital education products *Alina Guzik, Gdansk Tech* Study of the Time Windows Range Impact on Vehicle Routing Problem *Marisa Oliveira, Instituto Superior de Engenharia do Porto*
17:00	Coffee Break
17:30	**Speaker** Gilberto Santos (IPCA) "*On the way of generating wealth for nations - idea, invention, patent, new product, innovation, economic growth*"
18:30	End of the 1st day
20:30	Dinner

Time	Day 2 – 23nd May
09:30	Conference Registration
10:00	**Parallel Sessions II– Session 3 |** *Moderator: João Nabais* Product Service System Development for 3D Customized Production in Hospitals *Milene Santos, Universidade Nova de Lisboa* Features of Cargo Capacity Finding for Vehicles to Increase the Sustainability Level of Supply Chains *Natalya Shramenko, Hochschule Karlsruhe University of Applied Sciences* Sustainable open innovation ecosystems: do agri-food MNCs matter? *Nataliia Krasnokutska, Comillas Pontifical University* Remanufacturing Strategies for Second-Hand Systems *Luisa Fernanda Jimenez Ramirez, Universidad de Antioquia* The Social Economy and the R Principles in Third Sector Organizations in the District of Setúbal *Ana Teresa Rodrigues Vizinho, Instituto Politécnico de Setúbal*
10:00	**Parallel Sessions II – Session 4 |** *Moderator: José Carlos Sá* Reducing Error in Manufacturing in Industry 4.0: A Systematic Literature Review *Jacqueline Humphries, Technological University of the Shannon* Improvement of the manufacturing process of active pharmaceutical ingredientes *Raul Campilho, INEGI - Instituto de Ciência e Inovação em Engenharia Mecânica e Engenharia Industrial* Examination of tool wear in 3D printed Ti6Al4V *David Downey, University of Limerick* A New Model for Quality 4.0 *Jacqueline Humphries, Technological University of the Shannon* Productivity improvement of control cable manufacturing equipment for the automotive industry *Raul Campilho, INEGI - Instituto de Ciência e Inovação em Engenharia Mecânica e Engenharia Industrial*

10:00	**Parallel Sessions II – Session 5**	*Moderator: Ana Mendes* Intrinsic Availability of a Critical Productive Equipment *Teresa Morgado, Instituto Superior de Engenharia de Lisboa* Blockchain in a Maintenance Database *Teresa Morgado, Instituto Superior de Engenharia de Lisboa* The influence of Augmented Reality on the consumer purchasing process *Federica Murmura, University of Urbino Carlo Bo* Developed a TRIZ-Lean Methodology in Portuguese Navy Complex Systems *João Alves, Instituto Superior de Engenharia de Lisboa*
12:15	Closing Cerimony ICQIS 2023
12:30	Lunch - IPS' Restaurant
14:00	Social Visit

Speakers

Matevž Obrecht is an associate professor in the field of sustainable supply chain management and vice-dean for education on Faculty of Logistics, University of Maribor. His field of expertise covers environmental protection, renewable energy policy and supply, sustainable logistics, e-mobility, greening company's processes and integrating life cycle thinking and eco-design principles into sustainable supply chain management. He participated in different interenational projects such as RECOAUD (environmental management in Russian companies), VALORGASs (valorisation of household wastes for biogas production), EDECON (promotion and dissemination of eco-design) and ERASMUS+ (internationally recognized master study on logistics). His research work was awarded twice with "The award for contribution to sustainable development of Slovenia".

Gilberto Santos is an Assistant Professor at Polytechnic Institute of Cávado e Ave. He is a member of IEA - Institute of Applied Electronics (Vigo University) from 2012. He has participated in about 20 R&D projects. Gilberto participates as a speaker in several national and international conferences, and he is currently author of several publications in Industrial Engineering, namely, Innovation, Quality Management, Product Development and Integrated Management Systems (IMS)–QES (quality, environment and safety) (books, papers in international and national journals). He is member of the research team of several IMS - QES research projects and supervises Master and PhD thesis, as well, reviewer of international journals (Editorial Review Board - TQM Journal; International Journal of Engineering and Industrial management (Portugal); Revista Produção e Desenvolvimento/Journal Production and Development (Brasil); The International Journal of Engineering Technology and Scientific Innovation (India); Quality, Innovation, Prosperity (Slovakia). Sustainability (MDPI) and Standards (MDPI).

Abstracts

Knowledge base for innovations in higher education institutions (HEIs) towards smart and sustainable future: A study on EUDRES

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Abstract. An ecosystem where innovation is the goal, becomes an important proponent to promote a smart and sustainable future (SSF). In doing so, it is imperative to provide an enabling environment where innovative ideas leverage existing issues by combining various resources - intellectual, physical, human and financial- for innovation to be applied in real life. In this regard, higher education institutions (HEIs) are considered as a driver for regional innova-tion, as they provide enabling environment for idea generation, foster creation of new knowledge and expertise and in order to teach students, are in contact with the industry that has a vital role in the development SSF. Studies in the past examined the need for promoting innovation in the HEIs to create SSF. However, research about small cities and regions is scarce. With this background, Engaged, European, entrepreneurial university as driver for smart and sustainable regions (E³UDRES² or EUDRES) is a European universities alliance located in the small cities and regions, working together on research, teaching and innovation for creating the SSF. In this regard, the study aims to understand how the HEI in regions provides the enabling environment for innovation to create SSF, using the case of Vidzeme University of Applied Sciences, Latvia.

Further, the study throws light on knowledge base and resources on best practices related to innovation for the SSF. The study is conducted by applying multiple research methods such as content analysis, the Delphi method and a case study, and data mainly includes policy documents, written records and reports, and expert opinion. The outcome of this descriptive and exploratory study provides significant information on the implications of innovation at HEIs for SSF.

Keywords: Higher education, Innovation, Entrepreneurship, Ecosystem, Smart and Sustainable Future.

Adaptation of Portuguese agricultural Small and Medium-sized Enterprises to digital platforms

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Abstract. The age of digital transformation is upon us, characterized by the demands of the markets in which companies operate, with a view to responding more efficiently and effectively to customer requests, where companies are encouraged to adopt new business models based on digital platforms. In the current context of uncertainty and risk, in which companies operate, it is important to question the contribution of digital platforms. This investigation stems from the need to validate the contribution of digital platforms in the process of adopting electronic commerce by Small and Medium-Sized Enterprises, considering that these platforms ended up being intrinsically linked to the business models of these companies. In this sense, the methodology employed included the realization of interviews, with the aim of validating the selection of constructs made from the existing e-commerce acceptance models in the literature. The present study focus on Small and Medium-Sized Enterprises in the Agriculture Sector in Portugal, with a view to the business sustainability of the primary sector in Portugal.

Keywords: Business Models, Digital Platforms, Agricultural SMEs.

A comparative study of Service Quality in Portuguese and Angolan Higher Education Institutions

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Abstract. Quality in education is an important topic as it is reflected in the educational levels of a society. Many studies consider students as stakeholders, however, families, employers and society in general can also be a set of stakeholders in this educational process. This article addresses this issue from an international perspective, that results from a collaborative work carried out by Portuguese and Angolan researchers. He intends to study service quality in three Higher Education Institutions (HEIs), two in Portugal and one in Angola. The study was based on the HEISQUAL model, a modern approach to measuring the quality of service in higher education institutions. In past studies we used SERVQUAL model. It was possible to concluded that, for the institutions under study located in Angola, the evaluation made by the students is bottom. The quantitative methodology was used, supported by the new instrument called HEISQUAL, a questionnaire that aims to measure the quality of service provided by an HEI. The current survey follows a convenient sampling technique.

Based on these results, good practices were identified to be implemented to improve the Quality performance indicators in Angola. The half-yearly monitoring will allow following the evolution of this implementation. In addition to the scientific component, this work is based on a greater concern, namely the contribution to Sustainable Development Goal (SDG) 4 – Quality Education. It is expected that the application of good practices will result in the improvement of the quality of education perceived by the students.

Keywords: Education, HEI, Quality.

An optimization model for the selection of renovation actions in a building

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Abstract. In Portugal, as in all of Europe, there has been a growing concern about energy poverty and its impact on people's health and well-being. Rehabilitating and making buildings more energy efficient allows for the reduction of energy consumption, that is, transforming existing buildings into near-zero energy buildings (nZEB). Energy consumption in buildings can be reduced by implementing measures to improve energy efficiency. However, the choice of improvement measures to be implemented needs to be optimized since, in general, they require investments, despite causing a decrease in energy costs. The research provides a linear programming optimization approach based on a bi-objective knapsack model to pick the portfolio of actions to undertake while analyzing energy consumption reductions and investment payback periods. The model enables the selection of the investments required for the building to achieve nZEB certification. A case study is used to illustrate the model.

Keywords: energy buildings, energy consumption, energy efficiency, linear optimization model.

Adoption of Electronic Commerce by Portuguese Small and Medium-Sized Enterprises

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Abstract. Since the beginning of the 21st century, Small and Medium-sized Enterprises (SMEs) have been operating in the context of an economic crisis, with the added effect of the pandemic crisis, leading them to rethink how to act in the markets in which they operate. SMEs have assumed a relevant role in national economies, in terms of employment, production and turnover, with the assimilation of new information and communication technologies (ICT) becoming increasingly important, with a view to adopting e-commerce. Given the fact that SMEs represent a considerable segment of the companies in Europe, European entities (European Commission and European Parliament) proceeded to redefine their concept and sought to enable them to enjoy the economic and social benefits provided by ICT, through the adoption of e-commerce, in order to ensure a more active and influential presence with their customers. When inquiring about this matter, we came across the fact that most of the existing studies, within the scope of the adoption of electronic commerce, refer to its application in the context of large companies, in non-agricultural activities. Therefore, the need to carry out scientific research on this issue, which allowed us to determine the factors that influence the adoption of electronic commerce on agricultural SMEs. In this study, the factors that stood out to the acceptance / adoption of electronic commerce by agricultural SMEs are as follows: Perceived Utility, Risk Perception/Intent-Adoption of E-Commerce, Perceived Ease of Use, and Perception of Social Influence.

Keywords: E-Commerce, Adoption, Agricultural SMEs.

When we associate innovation to management and apply it to national parks. Case of Huascarán National Park Peru

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Abstract. Managerial innovation is the invention and implementation of new management practices, processes, structures, or techniques compared to what is known in order to achieve the objectives of the organization better.

The purpose of this paper is to clarify via an example the link between the application of managerial innovation techniques and protected areas; that is to say, to identify an internal action plan that applies in protected areas. In other words, should the manager apply the old style of management more (give orders, orient, direct, get the last word....) or attempt to bring to personnel into management, take into account their thoughts, and grow them as relevant human capital.

After the qualitative research: guide interview with National Park Manager, we understood that managerial innovation is being created to aid in the spontaneity of innovation and to more organically connect human relationships. To promote sharing and quality time, as was the case investigated in Huascarán National Park Peru, we need to learn more about the collaborative component and cooperative modality.

The main questions of this paper are: within natural and protected areas such as parks, managerial innovation may well be applied; here, we will study the case of Huascarán National Park Peru, and we will figure out how these areas are operated and the efficiency of managerial innovation?

Keywords: management; direction; innovation; managerial innovation; protected areas, national park

Enhancing Tourism through Local Development Strategies (LDSs): A Study of FLAG Marche Sud Area

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Abstract. The article focuses on the role of the Community-Led Local Development- (CLLD) methodology in the promotion of the integrated development of local communities. The study explores the potential of CLLD as a tourism enhancement tool for five municipalities within the FLAG Marche Sud area. The analysis has been carried out through a literature review and in-depth interviews. To explore the relationship between CLLD and tourism, local development strategies (LDSs) and stakeholder collaboration, the re-search examines the methodology in terms of its definition, funding, implementation, and monitoring. The findings suggest that the CLLD approach can help local communities to maximise the opportunities offered by EU funding streams, in particular through food festivals. Also, it can help them identify their strengths and develop tourism strategies that suit their peculiarities. Anyway, all the relevant stakeholders need to cooperate to ensure a successful implementation of the methodology. The study provides a theoretical contribution to how CLLD can be an effective tool for enhancing tourism within local communities. The present article is a groundwork for the FLAG-Marche-Sud marketing plan.

Keywords: Tourism, Community-led Local Development (CLLD), Local Development Strategies (LDSs), "Fisheries Local Action Groups (FLAGs)".

Erasmus+ 2021-2027 in Higher Education: Contributions to the 2030 Agenda and to the Sustainable Development Goals

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Abstract. The 2030 Agenda for Sustainable Development, approved by all UN member states in 2015, includes the 17 Sustainable Development Goals (SDGs), which are seen by Boeren (2019) as a Programme of actions not only for people but also for the planet and prosperity. These goals are essentially intended to help nations work together to build a cleaner world and a fairer global society while safeguarding the environment, and are aligned with those advocated by the Erasmus+ Programme. Both the Programme and the SDGs have goals to be achieved and associated indicators that should be used as tools to achieve these goals that corroborate those outlined in the 2030 Agenda. This work aims to find out to which SDGs contribute most the Erasmus+ Programme. To this end, we used a qualitative analysis of the Regulation that led to the creation of the Erasmus+ Programme for the period 2021-2027 and the 17 SDGs. It was concluded that the most relevant SDGs are 4, 5, 8, 9, 10, 13, 16 and 17 and that the Erasmus+ Programme seems to have a strong potential to drive and mobilize Sustainable Development in the world through the participation of people and the projects implemented and developed. It was also concluded that SDG 4 contributes directly or indirectly to the other selected SDGs, but no SDG contributes to SDG 4.

Keywords: Erasmus+ 2021-2027, Higher Education, 2030 Agenda, Sustainable Development Goals.

Exploring the Potential Contribution of Blockchain Technology to Sustainability Reporting

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Abstract: This article aims to create a space where contemporary arguments on sustainability, corporations' social responsibility, and blockchain technology can be all discussed together. It offers a new corporate communication tool with a blockchain solution. Corporations are under social pressure for the environmental and social damages they cause. However, their sustainability initiatives and reports are criticized due to the vagueness of their content. This criticism led organizations to practice under the name "Corporate Social Responsibility" (CSR) and standardize performance transparency. But CSR reports may not also provide accurate results because traditional reporting techniques do not allow clear communication for various reasons; lack of standardization, neutrality, and trustworthiness. Considering executives can distort corporate information to include merely positive ones and CSR reporting is only voluntary, it is natural to raise doubts about the reports. After all, CSR activities attempt to achieve more ethically sound practices. Within this framework, taking advantage of developing technology is vital. Blockchain technology promises to meet sustainability requirements and ensure report reliability. The outcomes of pilots show using blockchain technology in the sustainability area offers potential. Its key features—decentralized trust, traceability, and immutability—make blockchain a feasible option for CSR reporting too. In this article, we identify the problems of CSR reports and show the suitability of using blockchain in the reporting area. We followed the article called "A Ten-Step Decision Path to Determine When to Use Blockchain Technologies" and answered their questions about using blockchain technology for sustainability reporting. This question set helps to identify needs, participants' interactions, behaviors, and community rules. Our analysis shows that using blockchain for CSR reporting is a viable option. Blockchain-based sustainability reporting mechanisms may force companies to be more transparent in their initiatives. Such a corporate communication tool prevents distortion of public information and increases company visibility.

Keywords: blockchain, sustainability, reporting.

Applying the concept of sustainable new product development in digital education products

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Abstract. Introducing sustainability goals into management and business processes is currently one of the most important trends worldwide. A true change in this approach cannot take place without conscious decisions from the very beginning of new product development including idea incubation, design, planning and prototyping. This is driving the growing popularity of the concept of sustainable new product development (SNPD), which entails conscious and structured action in the design of new products.

The aim of this study is to define whether and how designers incorporate the idea of sustainability into the new product development process and also to contribute to development of a conceptual framework for putting the idea of SNDP into practice. Our focus is the ever-growing digital education sector.

Our exploratory study was conducted in 2023 in a group of EdTech new product designers. The study was designed in two phases, with the first phase (qualitative research) was based on in-depth structured individual interviews and the second phase (quantitative research) was carried out using an online survey. Qualitative content analysis (first phase) and statistical analysis (second phase) were used to analyze the data.

As a result, we've defined how a sustainable approach was implemented in the design of EdTech products. In doing so, we've identified the methods used to introduce SNDP ideas for digital educational products.

Our study sheds new light on the SNDP concept, in conjunction with its application in the EdTech industry. It also has practical implications, as it provides a set of methodological guidelines in the area of new product development in the EdTech industry. They can be helpful to product development teams who want to consciously incorporate SDNP ideas into their own designs.

Keywords: TPM, Lean, Intrinsic Availability.

Study of the Time Windows Range Impact on Vehicle Routing Problem

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Abstract. The purpose of this paper is to study and explain the impact of the length of the Time windows in the vehicle routing problem with time windows (VRPTW). A case study was explored with the aim of understanding the relationship between the use of time windows with different intervals and the cost of charges, client satisfaction, and travel time. The solution presented studies the influence that time windows have on delivery costs. In it, is possible to verify that the number and the capacity of needed vehicles to the service varies, as well as the number of served clients in a route, according to their schedule and demand, and the size of the time windows in which deliveries are made. As a result, the time window negotiation is important and related to the operational services with a huge impact on the global business.

Keywords: VRP, VRPTW, cost optimization, route optimization.

Product Service System Development for 3D Customized Production in Hospitals

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Abstract: Customized prothesis and orthosis (P&O) manufacturing is growing as a market advantage and as a contribute to positive impact on patient's well-being. 3D printing allows a flexible manufacturing, adapting different characteristics according to the patient's requirements, while increases the device functionality. Considering the relationship between the customized P&O and the extended attendance that patients need, this manufacturing approach is requiring a new system which can consider not only the product but also an integrated service. Despite the huge potential that Product Service System (PSS) could have in healthcare industry there is a lack of research around the topic PSS is a supporting network which is related to the product that generate value while satisfy the customer's needs. The objective of this paper is to identify representative PSS models applied to the healthcare context and find a proposal that can be applied to 3D printing customized P&O. Pursuing this objective, a review on PSS business models applied to healthcare was driven. This paper aims the integration of the business models proposed in the literature, to mitigate the limitations presented in the current state-of-art.

Keywords: Customized, 3D printing, Product-service system, Prothesis and orthosis.

Features of Cargo Capacity Finding for Vehicles to Increase the Sustainability Level of Supply Chains

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Abstract. The paper highlights the feature of determining cargo capacity for vehicles fleet using system assessment during perishable agricultural products supplying. The proposed approach can increase the sustainability level of the supply chain function, especially, during agricultural cargo transportation over long distances. The unique approach is based on the fact that current delivery options were grouped for considered goods categories using the main technological criteria. This, in turn, made it possible to distinguish the average cargo capacity parameter for trucks fleet used in transportation. Such logistics solution allows carriers to find a rational value of average truck tonnages for a particular type of supply chain. Firstly, rationalizing such a technological parameter as average load capacity allows for reducing unjustified operating costs that arise during perishable agricultural product transportation. The study determined quantitative values of average carrying capacities for vehicle fleets for each supply chain. This aspect is planned to be used for designing models that simultaneously consider the interests of carriers and customers of perishable agricultural products.

Keywords: Sustainable Supply Chain, Agricultural Perishable Cargo, Transportation, Row of Cargo Capacity, Truck.

Sustainable open innovation ecosystems: do agri-food MNCs matter?

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Abstract. The fragility of the modern world requires increased attention to the changes that can ensure sustainable transitions, especially in the agri-food industry known as one of the most influential on human well-being. Providing transitions is possible only with the involvement of as many stakeholders as possible, including agri-food MNCs, which set sustainable development trends, form appropriate patterns, and transfer them to different countries and ecosystems. In this regard, the study explores the open innovation approach for building sustainable agri-food ecosystems where MNCs play a transitional role. The research is based on inductive methods, multiple case study analysis and mapping, and answers the questions (1) what sustainable dimensions drive MNCs to adopt the open innovation approach, (2) what open innovation modes prevail in agri-food MNCs - inbound, outbound, or coupled, and (3) what sustainable patterns of open innovation collaboration make a transactional effect at the food ecosystem. The research findings contribute to empirical studies and help to understand the modes of sustainable open innovation in the agri-food industry, specifically highlighting the transitional patterns of interactions between MNCs and other agri-food ecosystem actors. The findings will be helpful for sectoral policymakers and managers dealing with sustainable development as well as for researchers who explore the sectoral context of sustainable open innovation.

Keywords: open innovation, agri-food MNCs.

The Social Economy and the R Principles in Third Sector Organizations in the District of Setúbal

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Abstract. This study aims to analyze how non-profit and public utility organizations in the district of Setubal promote a Circular Economy and apply the R principles and sustainability policy.

Motivated by the lack of previous studies that relate Social Economy (SE), Circular Economy (CE), R Principles and Sustainable Development Goals (SDGs) applicable to the Social Economy, the following question arose: in what way are non-profit and public utility organizations concerned with the fulfillment of the new Sustainable Development Agenda entitled "Transforming Our World: the 2030 Agenda for Sustainable Development", published in 2015 by the United Nations (UN) and to be implemented by 2030.

A survey was sent to a random sample of 100 organizations, obtained by cross-referencing a list from Social Security in Portugal with the Portuguese Tributary and Customs Authority's list of entities receiving the 0.5% remittance of Personal Income Tax (PIT). The survey questions focused on the 10 Rs of sustainability policy, and how the SDGs are relevant to their mission.

The results show that there is some knowledge on the subject, and attempts to implement it, but the resistance encountered discourages its application. SE can be a pillar for the development of the CE, but this will require measures to encourage stakeholder involvement, through information targeted at this socio-economic sector.

Keywords: Circular Economy, Social Economy, Sustainability, SDG.

Reducing Error in Manufacturing in Industry 4.0: A Systematic Literature Review

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Abstract. Error has always presented a challenge for the quality team, but never more so than under Industry 4.0. In Industry 4.0 the operator is required to work on more complex products, be flexible across processes, and be interconnected to machines, dealing with streams of in-process data. This change in work has led to higher error and, therefore greater challenges for the quality function. In order to understand how best to apply the capacity available under Industry 4.0 to ease this burden, it is important first to understand the current approach to quality, and where the research gaps lie.

In this paper, an analysis of how error and quality has been managed in manufacturing, in the first ten years of Industry 4.0 is completed, using a systematic literature review.

Seven thematic clusters are identified in this research from sixty four selected papers. They are Quality Management Systems, Total Quality Management, Measurement and Analysis, Human Factors, Technology, Human Systems Integration and Training. A synthesis of the thematic clusters reveals sustaining innovations across all activities. The summary of current approaches will assist quality teams better to improve their approach to reduce error; and will identify where there are future research opportunities.

Keywords: error; quality; manufacturing; Industry 4.0.

Improvement of the manufacturing process of active pharmaceutical ingredients

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Abstract. Currently, the pharmaceutical industry needs to optimize industrial drug processing processes. The constant improvement of industrial equipment is an unavoidable strategy to improve the quality of the process, as well as its efficiency and productivity. This work aims to analyze and implement improvements in equipment integrated into production processes in pharmaceutical laboratories to produce active pharmaceutical ingredients (API). In the project, studies were carried out using the finite element method (FEM) and traditional structural design, to test the feasibility of the selected solutions. Then, the cost analysis was carried out, and the benefits and results of the new equipment were presented. It was possible to conclude that the proposed equipment demonstrates advantages at an ergonomic, hygienic and practical level compared to the original ones, which translates into an increase of the company's competitiveness in the pharmaceutical market.

Keywords: Pharmaceutical industry, Active pharmaceutical ingredients, Spray Drying, Standardization, Process improvement, Finite element method.

Examination of tool wear in 3D printed Ti6Al4V

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Abstract. With the introduction of additive manufacturing (3D printing) for the fabrication of titanium (Ti6Al4V) components in the medical/aerospace and automotive industries, complicated geometries can be manufactured with almost total design freedom. However, the consequence of designing with such openness and the requirement to print a geometrical shape that may include many angles, radii and swept surfaces, means that microstructural anisotropy caused by the additive manufacturing process must be considered. An example of a 3D printed near net shaped product is a femoral knee implant. Microstructural anisotropy has an impact on the mechanical characteristics of the printed components and, therefore, their machinability [provide a reference]. Finish-machining operations are currently performed on titanium parts printed using selective laser melting (SLM) with the same cutting tools used to process wrought titanium components. However, previous studies suggest cutting forces for components manufactured using SLM can be up to 70% higher than for their wrought counterparts for Ti6Al4V [provide a reference]. Temperatures at the cutting interface of a 3D printed material can also exceed that of wrought titanium and severely impact tool wear. While the criteria for tool wear may be similar for both 3D printed and wrought materials, the rate of wear may differ during the machining process. The impact of these issues on the choice of cutting tool material and on tool lifetimes will be discussed.

Keywords: Printed Titanium Ti6Al4V, Additive manufacturing, Tool wear, Build orientation, Microstructural anisotropy.

A New Model for Quality 4.0

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Abstract. Traditionally, efforts to ensure quality were grounded in a rigorous industrial engineering approach. However, there has been a dramatic shift in how manufacturing is carried out, due to the disruption inherent in Industry 4.0. The traditional methods of managing quality are not flexible enough to cope with the pace of change in modern manufacturing and the Factories of the Future. Discourse around modern quality management primarily focuses on the new digital tools available under Industry 4.0. Digital tools, in of themselves, will not address the complexity of the quality management problem. A new model for Quality 4.0 is required.

In this research, a literature review was completed to investigate how quality is being managed in the era of Industry 4.0. A new model for Quality 4.0 is proposed based on the findings. The model has at its foundation three pillars of Process, Human and Technology. The model integrates these pillars within the traditional rigorous industrial engineering approach and systems for quality management, which include Quality Management Systems, Total Quality Management, and Measurement and Analysis.

The impact of this research is a generalizable model for real-world quality systems fit for the future. The model highlights the digitalization skills and quality structures required for a flexible data-driven modern Quality 4.0 system.

Keywords: error; quality; manufacturing; Industry 4.0; Quality 4.0

Productivity improvement of control cable manufacturing equipment for the automotive industry

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Abstract. The automotive and automotive component manufacturing industry constitute one of the sectors with highest impact on the economy of many European Union countries. Due to the high competitiveness that characterizes the automotive sector, and the enormous variety of processes inherent to the production of the most varied components, there is an intensive search for improvements that translate into significant impacts on the productivity of these processes. This work was based on a need identified by a Portuguese company, regarding the improvement of the productivity of a control cable manufacturing equipment for the automotive industry. The main objective is related to the development of a new stripping machine concept that allows the coating removal from two cables simultaneously, thus eliminating an existing bottleneck in the injection process of the first ZAMAK terminal. A prototype of the machine was built, and the new concept validated, and then implemented in the factory. An automatic cable extraction system was also designed aiming to reduce the number of manual tasks performed by the operator, with the expectation of further improving the productivity of the process. The development of the two new mechanisms discussed in the present work followed the Design Science Research (DSR) methodology. With the implementation of the new double stripper concept, a 62.4% increase in productivity at the ZAMAK injection station was found, which was reflected in annual savings of around €42,614. Regarding the automatic cable extraction system, additional productivity gains of 15.6% are estimated. Therefore, with the joint implementation of the two improvements, an increase in total productivity of around 87.8% is expected, with annual savings of €51,816.

Keywords: Automotive Industry, Mechanical Design, Finite Element Method, Control Cables, Productivity, Design Science Research Methodology.

Intrinsic Availability of a Critical Productive Equipment

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Abstract. The current context of the world economy represents a significant challenge for industries. The prevailing process of globalization, constant technological evolution, and increased market competitiveness are forcing companies to act and adapt. Continuous improvement actions are needed to reduce waste, increase productivity, quality, and delivery levels, and simultaneously reduce the costs associated with production processes. The main objective of this research was to increase the Intrinsic Availability of assembly line production equipment to achieve and guarantee a world-class goal of 90%. This work was developed in partnership with a company dedicated to manufacturing and assembling metallic structures for the aeronautic industry. The methodology applied in this research is based on TPM and Lean tools. Positive results were achieved since, at the end of the method used, it was possible to reach 91.80% Intrinsic Availability of the equipment, exceeding the objective of 90%, and an average OEE value of 66.7% compared to the initial 58,1%, associated with a 170.9% increase in MTBF and a 48.4% reduction in the total downtime of the machine, compared to the initial situation.

Keywords: TPM, Lean, Intrinsic Availability.

Blockchain in a Maintenance Database

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Abstract. Nowadays data management is part of the maintenance management. Organizations are now gathering a diverse range of data, including information from sensors and operator logs, among others. To structure a database may be a challenge when organizing data collected from sensors on a ship, and the difficulty increase when maintenance managers apply algorithms trying to give early results from data that will support decision making. A Blockchain structure is not unbreakable but is safer than others known structures. It will be exposed how a blockchain structure applied to data collected from equipment's may enhance the database integrity and security. A state of art on blockchain and maintenance are made to expose its advantages in the maintenance management, and then it will be proposed a data structure for a maintenance ship system and present some directions for further studies. Also, the Portuguese Navy maintenance organization for surface ships and the advantages and disadvantages of blockchain in it are presented.

Keywords: Blockchain, Database, Maintenance, Security.

The influence of Augmented Reality on the consumer purchasing process

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Abstract. Augmented Reality (AR) has recently gained the attention of both scholars and practitioners thanks to its ability to provide captivating and immersive experiences that lead users to fully engage in the proposed content. Despite the increasing use of AR by companies and individuals, there are still few empirical studies investigating its influence on consumer behaviour, therefore, the present study intends to analyse the different behaviours and attitudes of consumers during their purchasing process in front of AR technologies. To this end, an online questionnaire was submitted to individuals belonging to different generational cohorts, obtaining 337 responses. From the results it emerged that most of the sample expressed a more than positive opinion regarding the help that AR technologies could give to the consumer when he/she chooses and buys a product. Understanding the characteristics of the product, having a unique experience with it during the purchasing process and making choices with more awareness and fastness are some of the positive aspects that were identified by the respondents.

Keywords: Augmented Reality; Consumer Behavior; Industry 4.0

Developed a TRIZ-Lean Methodology in Portuguese Navy Complex Systems

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Abstract. To maximise safety and the useful life of the equipment while reducing costs, new philosophies and tools must be used to replace the old maintenance habits. A TRIZ-Lean approach, applied to maintenance management, promises to reduce non-value activities maintenance, minimise energy and resource consumption by giving innovative solutions. This paper aims to develop a methodology that uses TRIZ and Lean tools to implement a new maintenance management solution in complex naval systems The equipment studied in this work was the central air system on naval ships. This system is responsible for pressuring atmospheric air, allowing many ship functions to be performed. In conclusion, the TRIZ-Lean methodology developed showed the potential to improve efficiency, reduce waste, and increase productivity, allowing an easy understanding of the influence of the parameters in the value chain of the Portuguese Navy's ship system.

Keywords: TRIZ-LEAN, Navy Systems, Maintenance Management.

Factors and Attitudes Influencing the Implementation of Reverse Logistics (Recycling). The Case of Portuguese Consumers

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Abstract. Considering that many companies have begun to adopt Reverse Logistics (RL) as a strategy, consumer behaviour has become a conditioning factor. The aim of this research is to identify the factors and attitudes that influence the consumer to practice RL, more specifically recycling.

The investigation uses exploratory research through secondary sources and descriptive research using a questionnaire adapted from the investigation by Bezzina and Dimech (2011), among the Portuguese population over 18 years of age. In this study, a non-probabilistic convenience sampling method was chosen using the snowball sampling method. The data resulting from the study were analysed using descriptive statistics and factor, cluster and discriminant analysis.

As results were identified four factors that influence the Portuguese consumer to perform RL: attitudes, norms and personal recycling skills; inconvenience; satisfaction with the service provided; and knowledge on the subject. Three distinct consumer types were also identified: stimulable; disengaged; ambassadors. The study contributes to understanding that ecological knowledge, financial incentives, purchasing advantages and the complexity of carrying out RL (recycling) influence the consumer's attitude towards returning waste.

Keywords: Reverse Logistics, Recycling, Factors.