



## D5.8 JOINT RESEARCH AND INNOVATION PROJECTS- 1ST REPORT

*(October 2022)*

*(Technological University of the Shannon (TUS, WPL)*

*(IPCA, WPCoL)*

## Table of Contents

1. Introduction.....	3
2. Catalogue of selected case studies of successful joint research and innovation projects developed by RUN-EU.....	9

## List of Figures

Figure 1- Values and Principles for Research and Innovation.....	4
Figure 2- RUN-EU Research Area Clusters.....	5

## List of Tables

Table 1- RUN EU Summary Project Submissions.....	5
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## 1. Introduction

The European Union is facing enormous societal, ecological and economic challenges. The Covid-19 pandemic is not over and there is a need to build back better, achieving the green and digital transition. Through the joint efforts of the established expert research area teams RUN-EU fosters closer collaboration to co-design and coordinate the implementation of research projects and proposals strengthening the overall the RUN-EU Research Area actions. The adoption of joint projects is a step forward in our ambition to create a RUN-EU Research Area fit for the future driven by our common commitment to mobilise research and innovation activities with concrete actions towards the challenges of today. It will facilitate economies of excellence deepening our knowledge and increasing overall RUN-EU researcher participation in global research project areas enhancing access to research and innovation excellence and enhancing interconnections between innovation ecosystems across the RUN-EU.



**Figure 1- Values and Principles for Research and Innovation (From ‘A Pact for Research and Innovation in Europe’ ([https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/european-research-area\\_en](https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/european-research-area_en))).**

Throughout WP5 Discovery programme we have constructed a new shared interdisciplinary innovation ecosystem (eight research areas) which to facilitate the creation of a research-driven inter-university RUN-EU campus, embedded in all the regions, and in collaboration will all the relevant stakeholders, incentivising high-quality researchers and innovators to work together to transform the innovation landscape.

To deliver on our shared vision to become a global innovation leader RUN-EU has initiated the RUN-EU research mobility programme across the network supporting the development of key enabling activities facilitating the preparation and submission of research projects and proposals while and strengthening the eight RDI research teams. The international internship programme for the mobility of researchers is also a key driver of mobilizing and internationalizing our research capabilities. Within the project we have committed to preparation of at least fifteen joint research and innovation projects involving members of our international future looking RDI teams across a broad range of common research areas over the three years period.



**Figure 2- RUN-EU Research Area Clusters.**

The joint RDI team members will define the projects. The joint collaborative research and innovation projects, combined with all other activities of the discovery programme, will serve to further develop and expand the RUN-EU capabilities in key EU funding programmes such as Marie Skłodowska-Curie, Erasmus, etc., To circumvent the previous extensive limitations and current limitations of travel due to Covid-19 the RUN-EU Management Committee decided to pursue Exploratory Missions resulting in a change from bilateral Exploratory Missions to subject specific Group Exploratory Missions (GEMs) inclusive of a research specific element. GEMs were organised, based on the different domains within the partner universities. To date GEMs have been hosted across all RUN-EU participant universities with two-hundred and sixteen academic, administrative, research and student participants from varying departments and faculties, also across the eight research cluster areas and the three overarching RUN-EU thematic areas of Future Industry and Sustainable Regional Development, the Bio-economy and Social Innovation. By the end of the project, RUN-EU partners expect to have started the fifteen new innovation and research projects (funded by European, international, and national financial sources or with the support of RUN-EU member funds). Successful project applications will be shared among all members as good practice examples.

This deliverable is the first catalogue of case studies of successful joint research and innovation projects developed by RUN-EU.

**Table 1- RUN EU Summary Project Submissions**

	Partners	Research Project Title	Funding Body	Award	Status
<b>1</b>	FHV TUS	COMENT-Fostering Innovation in Community Led Enterprise Development'	Erasmus+ Programme Key Action 220 Cooperation Partnerships in	300,000€	Approved

			higher education [KA220-HED]		
<b>2</b>	IPL, TUS & Others	STC 4.0 HP - New Generation of Stoneware Tableware in Ceramic 4.0 by High Pressure Casting RobOot work cell	PT2020 - POCI - Programa Operacional de Competitividade e Internacionalização	984,279€	Approved
<b>3</b>	TUS & IPL	Joint PhD -Film-Induced Tourism in Europe: Impacts and Marketing Strategies	Higher Education Authority Ireland	81,000€	Approved
<b>4</b>	IPL & IPCA	S&G-POR: Sustainability of gastronomic practices in Portugal - Adherence Level of Higher Education Institutions	FCT - Projetos de I&D	249,778€	Not approved
<b>8</b>	IPL & IPCA	DesignObs 4.0 - Observatório de Design: Dados Combustíveis para uma Sociedade Portuguesa 4.0	FCT - Projetos de I&D	249,896€	Not approved
<b>9</b>	TUS & IPL	Joint PhD-From Sea to pharmacy: an integrated and sustainable valorisation of the red seaweed Gelidium corneum for cosmeceutical applications	Higher Education Authority Ireland	81,000€	Approved
<b>10</b>	FHV & SZE	Basic research in Medical Mixed Reality Applications	FWF Joint Projects (Austrian Part) and NKFIH – National Research, Development and Innovation Office (Hungarian Part)	246,625€	Not approved
<b>11</b>	TUS & IPL	Joint PhD - Sustainability of 3D printing for building construction using innovative and ecological materials.	Higher Education Authority Ireland	81,000€	Approved

12	FHV, HAMK, SZE	VENUS - Centre of Vocational Excellence in Nursing Studies	EU Erasmus+	635.922€ (FHV, Lead partner) 415,673€ (HAMK) 414,047€ (SZE)	Not approved
13	TUS & IPL	Joint PhD - Hybrid behaviour-based network intrusion detection system	Higher Education Authority Ireland	81,000€	Approved
14	TUS & IPL	Joint PhD - An examination of the Sustainable Practices implemented by Portuguese Hotels.	Presidents Scholarship Award TUS	75,000€	Approved
15	TUS & HAMK	Joint PhD - Leadership behaviours and wellbeing experiences at work: A case study in Finland	Presidents Scholarship Award TUS	75,000€	Approved
16	TUS & IPL	Joint PhD - Towards the development of an innovative Sustainable Sports Tourism Management Framework for Portugal	Presidents Scholarship Award TUS	75,000€	Approved
17	IPL & TUS	Joint PhD Title: Key Performance Indicators for the Financial Sustainability of Hotels: The New Post-COVID Era	Presidents Scholarship Award TUS	75,000€	Approved
18	HAMK, TUS, IPL, SZE	ENGAGE - Enhancing Engagement in Online Learning using a Design Thinking Approach	Erasmus+ - Key Action 2	263,822€	Not approved
19	IPL & TUS	Joint PhD Robotic & Automation Title: Agile System Integration for Industry 4.0	Presidents Scholarship Award TUS	75,000€	Approved
20	TUS & IPL	Joint PhD - An approach to integrating manufacturing data from legacy Injection Moulding Machines using OPC UA	Presidents Scholarship Award TUS	75,000€	Approved

21	IPL & LIT	BacToSea: Targeting marine microbial communities for greener antifouling solutions	FCT - Projetos de I&D	249,182€	Not approved
22	IPL & IPCA	LeanGreen2CE: Lean green to support circular economy development in companies	FCT - Projetos de I&D	218,719€	Not approved
23	TUS & IPL	Joint PhD Algae-based approaches to improve composting process and recycle compost in mushroom industry	Higher Education Authority Ireland	81,000€	Approved
24	TUS & IPL	Joint PhD - An Examination of the Sustainable Management of Tourism in Portugal	Presidents Scholarship Award TUS	75,000€	Approved
25	LIT & IPL	Skills4Needs - Gathering skills intelligence to trace the needs for emerging occupational profiles and reconfigure the tourism service design with green, digital and transversal skills	Erasmus+ - Key Action 2	115,311€	Not Approved
26	IPL, TUS & others	Agricity	PT2020 - POCI - Programa Operacional de Competitividade e Internacionalização	982,811.00 €	Approved
27	IPL, TUS & others	Invisible 5G Virtually Invisible Small-Cells for 5G Densification	PT2020 - POCI - Programa Operacional de Competitividade e Internacionalização	1,040,630.44 €	Approved
28	IPCA, TUS, FHV	ORCHESTRA - add-value to ORCHards through thE full valoriSaTion of macRoalgAe	PT2020 - POCI - Programa Operacional de Competitividade e Internacionalização	990,643.77 €	Approved
29	IPL, IPCA	Knowledge Circle	PT2020 - POCI - Programa Operacional de Competitividade e Internacionalização	484,900.63 €	Approved



## 2.Catalogue of selected case studies of successful joint research and innovation projects developed by RUN-EU

Research & Innovation Project Case Study 1	
<b>Project Title</b>	add-value to ORCHards through thE full valoriSaTion of macRoalgAe
<b>Project Acronym</b>	ORCHESTRA
<b>Funding Call</b>	PT2020 - POCI - Programa Operacional de Competitividade e Internacionalização
<b>Award Value</b>	990 643,77 €
<b>Grant Agreement Number</b>	POCI-01-0247-FEDER-070155
<b>Start Date</b>	2021-02-01
<b>Term</b>	2023-06-30
<b>Co Ordinator or Partner</b>	CAMPOTEC IN - Conservação e Transformação de Hortofrutícolas, S.A.  Polytechnic of Leiria – scientific coordinator

<p><b>RUN-EU Principal Contact Person</b></p>	<p>Délio Raimundo (Campotec in) Marco Lemos</p>
<p><b>RUN-EU Participants</b></p>	<p>POLITÉCNICO DO CÁVADO E AVE (IPCA), POLITÉCNICO DE LEIRIA (IPL) VORARLBERG UNIVERSITY OF APPLIED SCIENCES (FHV), TECHNOLOGICAL UNIVERSITY OF THE SHANNON (TUS)</p>
<p><b>RUN-EU Research Area Cluster</b></p>	<p>RA 2: Food &amp; Biotechnology</p>

### **Brief Description of the Research Project:**

The Fruit Sector is an important part of the European Agroindustry, accounting for 14% of the value of the EU agricultural production, while this supply chain has an estimated turnover of more than 120,000 million € with approximately 550,000 employees and 1.4 million farm holdings. Particularly, in the Portuguese West Region, pear and apple production have a significant role, being responsible for the creation of a significant number of direct and indirect jobs. Due the continuous growth of the global population and the limited global cropland, it is crucial to guarantee the food safety and for all, sustaining UN Sustainable Development Goal (SDG) “Zero Hunger” while also contributing for “Good Health and Well-Being”. To achieve that, the reduction of crop loss from pest origin and providing plant resistant to external factors is mandatory, while assuring the extended shelf-life during storage and the distribution chain. This is nowadays guaranteed by synthetic compounds, that have ultimately been pointed as risk factors for the environment and public health, while also reducing fruit nutrient quality. Also, due to the increasing consumers’ concerns about this theme, “natural” and “green” solutions as efficient alternatives to chemically orchestrated products/additives, there is additional pressure in the agriculture sector to seek novel, effective, and feasible eco-friendly solutions. Also, the growing niche of biological items, has placed producer with a greater challenge: to provide the market with a sustainable production at a reasonable cost while keeping the “bio” branding. These problems are shared by CAMPOTEC concerning its major cultivar of Pera Rocha (pear) and Maçã de Alcobaça (apple). In an endeavour with the Polytechnic of Leiria and the Polytechnic of Cávado e Ave, and the international institutions Limerick Institute of Technology (Ireland) and the Vorarlberg – University of Applied Sciences (Austria), this multidisciplinary consortium proposes to tackle these agro-industrial issues by creating an invasive seaweed biorefinery, which at the same time reduces these seaweed impacts in the environment, can provide seaweed extracts with the potential for pest-control, plant-priming, plant enhancers and fortifiers and ultimately, the final by-

product, can be used to improve soil quality. Besides these pre-harvest challenges, fruit long-term conservation will also be addressed in the same way to enhance shelf-life during storage and the distribution chain. Simultaneously, changes in phytonutrients of these fruits will be evaluated and correlated with the different farming practices, namely organic and intensive production, treated with the selected seaweed-extracts, followed by long-term storage using the most adequate treatments studied in the project. This way, it will be possible to evaluate results and variables and correlate them with apple and pear phytonutrients changes through the value chain and increase its acceptance and value, which will also be boosted by a socially responsible, economic and eco-efficient monitoring and report for the Industry’s Sustainable Practices. Summing up, **ORCHESTRA’s main goal** is to **add-value to invasive seaweed** through a circular economy biorefinery pipeline, applied to **provide solutions to pear and apple cultivars**, improving the value chain, with sustainable, eco-efficient, and socially responsible practices. ORCHESTRA will result in the development of new sustainable biological alternatives for pera Rocha and maçã de Alcobaça intensive production main challenges, through an economic and environmentally sustainable approach, creating a model which may be further replicated for other cultivar and sustaining a myriad of UN Sustainable Development Goals, such as #2 “Zero Waste”, #3 “Good Health and Well Being”, #4 “Quality Education”, #9 “Industry, Innovation and Infrastructure”, #12 “Responsible Consumption and Production”, and #15 “Life on Land”, and in a desired alignment with the EU Farm to Fork Strategy (COM(2020) 381), The EU Blue Growth Strategy (COM (2012) 494), the European Green Deal (COM(2019) 640), and the Circular Economy Action Plan (COM(2020) 98).

## Research & Innovation Project Case Study 2

Project Title

Fostering Innovation in Community Led Enterprise

	Development
Project Acronym	ComEnt
Funding Call	Erasmus+ programme, KA 2: Cooperation Partnerships in higher education (KA220-HED)
Award Value	300 000 €
Grant Agreement Number	2021-1-IE02-KA220-HED000032236
Start Date	2021-11-01
Term	2024-11-01
Co Ordinator or Partner	Technological University of the Shannon (TUS)
RUN-EU Principal Contact Person	Dr Shane O Sullivan
RUN-EU Participants	Technological University of the Shannon (TUS); FHV
RUN-EU Research Area Cluster	RA 7: Education and Social Sciences

**Brief Description of the Research Project:**

Overall, this project wishes to equip stakeholders with the necessary knowledge, skillsets and competencies to develop and enhance the development of community owned and community led enterprises, which would be an innovative approach to fostering social inclusion amongst marginalized groups and disadvantaged areas across Europe. Ultimately, the stimulation of this kind of thinking and the development of a competent body of practitioners throughout Europe will lead to an increase in this particular form of community development which is enterprise and employment focused; seeks to unlock and enable the use of dormant community assets; and provide locally focused goods and services which will have a social cohesion purpose and impact.

## Research & Innovation Project Case Study 3

Project Title	Agricity
Project Acronym	Agricity
Funding Call	PT2020 – POCI – SI I&DT
Award Value	968 790,64 €
Grant Agreement Number	POCI-01-0247-FEDER-070175
Start Date	2021-04-01

Term	2023-06-27
Co Ordinator or Partner	Axianseu - Digital Solutions, S.A.
RUN-EU Principal Contact Person	Carlos Rabadão
RUN-EU Participants	<p>Politécnico de Leiria; Instituto Politécnico de Coimbra; VisionWare - Sistemas de infirmação, S.A.</p> <p>Parceiro Internacional: Technological University of the Shannon (TUS);</p>
RUN-EU Research Area Cluster	RA4: IOT & Cybersecurity

#### **Brief Description of the Research Project:**

The aim of this project is to create a platform that will enable (i) using ion-selective electrodes (crystalline membrane electrodes), currently available on the market, to detect and monitor, over time, the presence of contaminating heavy metals , namely copper, which must present values below the VMA in the waters used in urban agriculture areas; (ii) collect information from a network of these sensors, dispersed in urban agriculture land; (iii) and communicate the data obtained in real time to a central platform; and (iv) centrally analyse the collected data and make them available to interested parties -farmers, municipal councillors or civil protection officials.

## Research & Innovation Project Case Study 4

Project Title	An examination of the Sustainable Practices implemented by Portuguese Hotels.
Project Acronym	N/A
Funding Call	PSF
Award Value	€75,000 (€1000 x 48 months, fees paid and €6000 for conference and travel expenses)
Grant Agreement Number	N/A
Start Date	February 2021
Term	4-year programme (student is currently in stage 2, term 3)
Co Ordinator or Partner	Technological University of the Shannon (TUS);
RUN-EU Principal Contact Person	Tony Johnston
RUN-EU Participants	Technological University of the Shannon (TUS);/Polytechnic of Leiria
RUN-EU Research Area Cluster	RA3: Tourism



**Brief Description of the Research Project:**

The concept of sustainability in the hospitality and hotel industry has been the topic of much discussion and debate in tourism and leisure management literature over the last decade. Key industry stakeholders including hospitality and hotel operators, policymakers and DMO's have been tasked with the challenge of transitioning operations towards more heightened levels of sustainable practice which has stemmed from EU, national and local level policies and guidelines. In Portugal, several strategies and plans have been developed with the aim of improving sustainable practices in hospitality and hotel industry, which focus on developing a more sustainable, competitive, and resilient sector moving into the future. However, there exists a current gap in knowledge in relation to the adoption and utilization of effective tools and models to measure and monitor sustainability performance in the hospitality and hotel industry in Portugal. It has been acknowledged that GDP from tourism in Portugal experienced a 75% drop, with overnight tourist stays in Portugal decreasing to 60% following a period of disproportionate impacts experienced during the COVID-19 pandemic. Such shortfalls have accentuated the need to effectively measure and monitor sustainability performance moving into the future as destinations now begin to re-emerge and re-imagine the way they operate. Through the adoption and utilisation of sustainable approaches and practices, the hospitality and hotel industry in Portugal could save costs in the short and longer term, they could benchmark success year on year and ultimately lead to the development of more sustainable and competitive industries moving forward. This research, while in its early stages, will aim to critically examine what, if any, sustainable and green practices are being adopted and implemented at present by Portuguese hotels. It will also permit an insight into whether or not Portuguese hotels are currently measuring and monitoring sustainability performance and looking to achieve greater levels of sustainability within the industry.

## Research & Innovation Project Case Study 5

Project Title	An Examination of the Sustainable Management of Tourism in Portugal
Project Acronym	N/A
Funding Call	PSF
Award Value	€75,000 (€1000 x 48 months, fees paid and €6000 for conference and travel expenses)
Grant Agreement Number	N/A
Start Date	February 2021
Term	4-year programme (student is currently in stage 2, term 3)
Co Ordinator or Partner	Technological University of the Shannon (TUS)
RUN-EU Principal Contact Person	Dr Tony Johnston
RUN-EU Participants	Technological University of the Shannon (TUS) /Polytechnic of Leiria

RUN-EU Research Area  
Cluster

RA3: Tourism

### **Brief Description of the Research Project:**

The importance of achieving effective sustainability performance in destinations worldwide has long been renowned. Destination policy makers and planners have been working towards a continual and ongoing transition towards the development of sustainable industries for the past three decades. This has subsequently been influenced through the development, provision and implementation of sustainable tourism plans, policies and strategies at International, European, National and local levels. Such plans and strategies are aimed at promoting balanced development that ensures tourism takes full account of its current and future economic, social and environmental impacts, while at the same time addressing the needs of visitors, the industry, the environment and host communities. However, sustainability is a transition and learning process and managing tourism growth together with addressing the needs of the industry, society and the environment as a whole has become a challenge for policy makers and DMO's alike, particularly in light of the COVID-19 pandemic. Nevertheless, it is incremental that destinations look to develop new ways of planning and seek to achieve new strategic positions to ensure the long-term sustainability, competitiveness and resilience of destinations moving into the future. Thus, this research will set forth to examine the impacts generated by tourism to the economic, socio-cultural and environmental resource base and in turn determine the current level of sustainable management of tourism by policy makers in Portugal.

## Research & Innovation Project Case Study 6

Project Title	STC 4.0 HP - New Generation of Stoneware Tableware in Ceramic 4.0 by High Pressure Casting Rob0ot work cell
STC4.0	STC4.0 HP
Funding Call	PT2020 – POCI – SI I&DT
Award Value	TOTAL – 984 279,05 € / IPLEIRIA – 257 122,67 €
Grant Agreement Number	POCI-01-0247-FEDER-069654
Start Date	2020-12-31
Term	2023-06-30
Co Ordinator or Partner	Grestel, S.A
RUN-EU Principal Contact Person	António Manuel Pereira
RUN-EU Participants	Politécnico de Bragança; Politécnico de Leiria; Technological University of the Shannon (TUS)
RUN-EU Research Area Cluster	RA 5: Advanced Manufacturing
<b>Brief Description of the Research Project:</b>	

The STC 4.0 HP project aims to develop a new generation of single fired fine stoneware tableware aimed at the potential of the Ceramic 4.0 paradigm. The implementation of robotization, cloud computing, artificial vision, ubiquitous computing, artificial intelligence and computer vision in high pressure forming processes and subsequent finishing of fine stoneware pieces makes it possible to adopt reduced thickness pieces (4mm-fine dinnerware). STC 4.0 HP promotes the adoption of industry 4.0, with the robotization of high-pressure demoulding, finishing and respective visual digital quality control. This project will allow productivity gains and resource optimization, allowing employees assigned to more repetitive and monotonous tasks to be used in tasks of greater added value and penetration on a global scale in specific market niches (Hospitality). This project will allow the introduction of disruptive methodologies in the current paradigm of the fine stoneware tableware industry, being a decisive step on the way to a 4.0 ceramic industry, with a strong component of versatility, production, quality, greener and valuing human capital

## Research & Innovation Project Case Study 7

Project Title	Leadership behaviours and wellbeing experiences at work: A case study in Finland
Project Acronym	N/A
Funding Call	PSF
Award Value	PhD fees
Grant Agreement Number	N/A

Start Date	Oct 2021
Term	4-6 years part time
Co Ordinator or Partner	HAMK
RUN-EU Principal Contact Person	Ms Michelle McKeon-Bennett
RUN-EU Participants	HAMK; Technological University of the Shannon (TUS)
RUN-EU Research Area Cluster	RA 7: Education and Social Sciences

**Brief Description of the Research Project:**

Leadership behaviour has a significant impact on employee behaviour, performance and wellbeing. Theory and research on leadership behaviour, however, has mainly focused on employee performance. Employee wellbeing is typically seen as a secondary outcome, typically measured by job satisfaction. A theoretical and practical gap therefore exists concerning the leadership behaviours and real-life wellbeing experiences at work. The studies that have focused on leadership behaviour and outcomes such as performance or wellbeing has seen little research conducted from a qualitative approach. Moreover, a limited number of studies have been conducted in Finland on the role of occupational health care regarding the effects of leadership on wellbeing at work. The aim therefore of the proposed exploratory case study is to investigate the lived experiences of leadership behaviour and its impact on wellbeing at work. The central research question is: What are employees' lived experiences of

leadership behaviour and its perceived impact on wellbeing at work while supported by occupational healthcare interventions?

## Research & Innovation Project Case Study 8

Project Title	INVISIBLE 5G VIRTUALLY INVISIBLE SMALL-CELLS FOR 5G DENSIFICATION
Project Acronym	INVISIBLE 5G
Funding Call	PT2020 – POCI – SI I&DT
Award Value	1 022 279,02 €
Grant Agreement Number	POCI-01-0247-FEDER-070175
Start Date	2021-07-01
Term	2023-06-30
Co Ordinator or Partner	Altice Labs, S.A.
RUN-EU Principal Contact Person	Rafael Caldeirinha

RUN-EU Participants	Instituto Superior de Engenharia de Lisboa; Politécnico de Leiria; Universidad Politécnica de Madrid; Technological University of the Shannon (TUS)
RUN-EU Research Area Cluster	RA 4: IOT & Cybersecurity;

**Brief Description of the Research Project:**

The Invisible 5G project aims to address the challenges of 5G network densification as a key factor in enabling 5G, particularly those arising from specific physical site requirements, which bring unique challenges to the design and implementation of small cells in urban settings, on the scale needed to secure future 5G coverage and services.

## Research & Innovation Project Case Study 9

Project Title	Towards the development of an innovative innovative Sustainable Sports Tourism Management Framework for Portugal
Project Acronym	N/A
Funding Call	PSF
Award Value	€75,000 (€1000 x 48 months, fees paid and €6000 for conference and travel expenses)



Grant Agreement Number	N/A
Start Date	February 2021
Term	4-year programme (student is currently in stage 2, term 3)
Co Ordinator or Partner	TUS Midlands Campus
RUN-EU Principal Contact Person	Dr Tony Johnston
RUN-EU Participants	TUS Midlands Campus/Polytechnic of Leiria
RUN-EU Research Area Cluster	RA 3: Tourism

#### **Brief Description of the Research Project:**

Sport tourism assumes an increasingly important role in the world tourism panorama, being seen by several nations as a strategic catalyst for the individual and collective emancipation of territories and their communities. The growing synergy between sports and the tourism sector and its potential as a strategic tourism product for the sustainable development of destinations has long been acknowledged; so much so that it has given rise to the positioning of a highly competitive and complex sector, transcending far beyond the organization of sporting events. In Portugal, Sports Tourism has experienced profound growth over the last decade, now estimated to be worth between 10% and 25% of total international travel and tourism revenues (PwC,

2021). While sports tourism presents valuable opportunities for further destination development and growth driving many positive outcomes in local economies, it can also be viewed as an important factor for the promotion and international recognition of these same territories. As a result, Destination Management Organizations (DMO) and other key stakeholder have begun to place an increased focus on the use of sports to promote and improve Portugal's positioning as a sports tourism destination. This research, while in its early stages, recognises a current gap in knowledge in relation to the development of existing frameworks or strategies implemented and applied by DMO's or policy makers within destinations to effectively develop and manage a sustainable and competitive sport tourism offering. However, in light of the challenges faced by destinations during the COVID-19 pandemic, it is a necessity that destinations look to develop and plan for sports tourism in a sustainable manner. This research therefore sets forth to contribute to new knowledge in relation to the development of an innovative Sustainable Sports Tourism Management Framework for Portugal with the aim to propose a new comprehensive conceptual framework for the effective sustainable development and management of sports tourism in Portugal.

## Research & Innovation Project Case Study 10

Project Title	Film-Induced Tourism in Europe: Impacts and Marketing Strategies
Project Acronym	N/A
Funding Call	Higher Education Ireland TUS PhD research Scholarship Programme
Award Value	78,000 €

Grant Agreement Number	N/A
Start Date	01/09/2022
Term	3-4 Years
Co Ordinator or Partner	Technological University of the Shannon (TUS)
RUN-EU Principal Contact Person	Nuno Miguel Castanheira Almeida/Kelly McGuire
RUN-EU Participants	IPL/TUS
RUN-EU Research Area Cluster	RA 3: Tourism

#### **Brief Description of the Research Project:**

Film tourism has assumed a vital role in the development and marketing of tourism on a world stage. It stimulates a heightened attractiveness of a destination from a consumer perspective and in turn generates substantial economic benefits for destinations at national and local levels. As a result, film tourism is viewed as a crucial strategy in the competitiveness of the creative destination. However limited research has been conducted on the development and marketing of film tourism and its perceived impacts on communities and key locations, particularly in Ireland and Portugal. This research aims to comparatively examine two destinations, Ireland and Portugal in order to determine the priority placed on film tourism development and marketing by destination planners. It further sets forth to examine the perceptions of communities from film tourism locations on the impacts of film tourism. A mixed

methodological approach will be employed using a quantitative content analysis and qualitative in-depth interviews with a representative sample of residents in key film tourism locations in Ireland and Portugal. The findings generated from this study may have implications and lessons learned for other European and International destinations moving into the future.

## Research & Innovation Project Case Study 11

Project Title	Algae-based approaches to improve composting process and recycle compost in mushroom industry
Project Acronym	N/A
Funding Call	Higher Education Ireland TUS PhD research Scholarship Programme
Award Value	78,000 €
Grant Agreement Number	Not Applicable
Start Date	01/09/2022
Term	3-4 Years
Co Ordinator or Partner	Technological University of the Shannon (TUS)

RUN-EU Principal Contact Person	Yuanyuan Chen/Rui Pedrosa
RUN-EU Participants	IPL/TUS
RUN-EU Research Area Cluster	RA 2: Food and Biotechnology

#### **Brief Description of the Research Project:**

There are several issues related to the composting process. The composting generates CO<sub>2</sub> and is usually released into the environment; the composting process generates wastewater, which needs to be treated prior to the discharge into the water bodies; the spent mushroom compost is not recycled to grow mushrooms again because of high salt content, and it takes too much water to wash the salt off the compost. Therefore, this project proposes algae-based solutions: 1) The development of an integrated system of a composter and an algae photo-bioreactor to use the CO<sub>2</sub> generated from the composting process to grow algae; 2) The treatment of the wastewater generated from the composting process by algae, which uses wastewater as the liquid medium and removes the pollutants via metabolism; 3) The desalination of the spent mushroom compost by using halophilic algae, which absorb the salt from the spent mushroom compost via metabolism; 4) The production of value-added biopolymers from the cultivated algae from the composting and compost recycling processes. This project will create economic, environmental and scientific impact by reducing CO<sub>2</sub> emissions, treating wastewater, recycling the spent compost, and producing biopolymers from cultivated algae. The applicant received a bachelor's degree and master's degree in marine biotechnology from IPLEIRIA, Portugal. During this PhD programme in TUS, the applicant will receive structured PhD modules and training in biopolymer production and characterization. The applicant will gain knowledge in mushroom cultivation from

collaborator Teagasc, the Irish Agriculture and Food Development Authority. The applicant will integrate with the research groups in TUS and participate in several existing projects, which will expand the knowledge and skills of the applicant and improve the employability and independence. This project will also enhance the collaborations and networks between RUN-EU institutes, contributing to the RUN-EU mission and goal of developing multinational interregional European University.

## Research & Innovation Project Case Study 12

Project Title	From sea to pharmacy: an integrated and sustainable valorisation of the red seaweed <i>Gelidium corneum</i> for cosmeceutical applications
Project Acronym	N/A
Funding Call	Higher Education Ireland TUS PhD research Scholarship Programme
Award Value	78,000 €
Grant Agreement Number	Not Applicable
Start Date	01/09/2022
Term	3-4 Years
Co Ordinator or Partner	Technological University of the Shannon (TUS)

RUN-EU Principal Contact Person	Susete Pinteus/Alice Martins/Patrick Murray
RUN-EU Participants	IPL/TUS
RUN-EU Research Area Cluster	RA 2: Food and Biotechnology

#### **Brief Description of the Research Project:**

Gelidium corneum is a red seaweed highly valued by the food industry. In Portugal its harvest is manually done by divers off the shore of S. Martinho do Porto in its unique bay. This valuable resource has a limited harvest (around 700 tons per year) and is being almost exclusively explored for agar extraction due to its excellent quality. However, Gelidium species are rich in other compounds with relevant biotechnological potential that could provide ingredients for other industries, also increasing the value of a resource important for a small fishing community which helps upkeep its ecological role by controlling and upkeeping natural seaweed populations. The main objective of this proposal is to contribute to a full valorisation of this marine resource by using a biorefinery approach. Two extraction methodologies will be assessed to compare their influence in compounds yields and agar quality. In following, the antimicrobial effects of metabolites will be assessed over several microbes of skin microbiota, with a particular emphasis to Cutibacterium acnes, responsible for acne vulgaris. Since inflammatory events are also associated with this pathology, the effects of compounds in several inflammation biomarkers will be also studied in different human cell lines. The traditional use for discarded biomass is to simply bury it in agricultural fields due to its capacity to act as a fertilizer. To take maximum advantages of seaweed residual biomass, a conversion into biochars/porous carbons will be performed aiming the improvement of soil retention water capacity and controlled release of fertilizers.

## Research & Innovation Project Case Study 13

Project Title	Sustainability of 3D printing for building construction using innovative and ecological materials.
Project Acronym	N/A
Funding Call	Higher Education Ireland TUS PhD research Scholarship Programme
Award Value	78,000 €
Grant Agreement Number	N/A
Start Date	01/09/2022
Term	3-4 Years
Co Ordinator or Partner	Technological University of the Shannon (TUS)
RUN-EU Principal Contact Person	Paul Archbold/ Florindo José Mendes Gaspar/ José Dinis Silvestre
RUN-EU Participants	IPL/TUS
RUN-EU Research Area Cluster	RA 6: Climate Change-Circular Economy and Decarbonisation



### Brief Description of the Research Project:

3D printing in construction and the use of sustainable materials, such as industrial wastes, have been recognized as a possible alternative to traditional concrete construction, mainly due to its potential to reduce environmental impact. Regardless of its up-and-coming popularity within the construction industry, no research has qualitatively investigated the environmental benefits that 3D printing brings. The concept of this project is to evaluate the sustainability of the 3D printing process and mortar mixes through the utilization of industrial wastes and natural fibres on cement and geo-polymeric based compositions, attending to the physical and mechanical requirements, while adding value to the waste and combating climate change. This proposal encompasses the following major goals: (a) identifying suitable industrial wastes and achieving required properties for mixtures; (b) understanding the rheology of composition for printability; (c) evaluating physical and mechanical performance and (d) investigating environmental trade-offs by conducting a detailed environmental Life Cycle Assessment (LCA). Keywords: Waste materials, Natural fibres, Life cycle assessment, Sustainability, 3D printing, Construction.

## Research & Innovation Project Case Study 14

Project Title	Hybrid behaviour-based network intrusion detection system
Project Acronym	N/A
Funding Call	Higher Education Ireland TUS PhD research Scholarship Programme

Award Value	78,000 €
Grant Agreement Number	N/A
Start Date	01/09/2022
Term	3-4 Years
Co Ordinator or Partner	Technological University of the Shannon (TUS)
RUN-EU Principal Contact Person	Seamus O' Ciardhuain/ Mário Antunes
RUN-EU Participants	IPL/TUS
RUN-EU Research Area Cluster	IOT and Cybersecurity

**Brief Description of the Research Project:**

Computer network security encompasses a comprehensive set of technologies dealing with intrusion detection. Despite the massive adoption of signature-based network Intrusion Detection. Systems (IDS), they fail to detect zero-day and previously unseen vulnerability exploits. Behaviourbased IDS are seen as a way to overcome signature-based IDS flaws through the implementation of machine-learning-based methods, to tolerate new forms of normal behaviour, and identify yet unknown malicious activities. Unconventional methods have also been applied to improve IDS performance. They speed up detection in real-time and are mainly statistical-based approaches such as the Newcomb-Benford law, also known as the first digit law. In general, this law states that

in the event of anomalies, the frequency with which the first digits appear does not follow the pattern of Newcomb-Benford's law. The proposed research aims to develop a hybrid innovative IDS architecture grounded on two distinct approaches: machine-learning and statistical analysis. A set of machine-learning methods will be implemented and evaluated to model the expected behaviour and known malicious activities. The IDS should identify new forms of normal behaviour and detect unseen malicious activity. The adoption of the Newcomb-Benford law in the IDS sensor will be evaluated in distinct directions: i) to fine-tune the machine-learning models previously trained; ii) as part of an ensemble of classifiers; iii) as a module to improve signature-based IDS decisions, to detect new forms of attacks not yet catalogued in the database. The research aims to provide a real-time and lightweight IDS sensor that can analyse network packet flows and alerts about deviations from normal behaviour in the network. The overall architecture and the network of IDS sensors will be evaluated with recent and well adopted datasets, namely those available at the CSE-CIC-IDS2018 project. The IDS will be benchmarked with signature-based IDS and state-of-the-art behaviour-based IDS with existing datasets and real-world networks.

## Research & Innovation Project Case Study 15

Project Title	Smart Diagnostic Audiology
Project Acronym	N/A
Funding Call	TUS Professional Development
Award Value	€11,000 (fees)
Grant Agreement Number	N/A

Start Date	N/A
Term	Research Masters Programme
Co Ordinator or Partner	Technological University of the Shannon (TUS)
RUN-EU Principal Contact Person	Dr Liam Brown and Joaquim Gonçalves
RUN-EU Participants	Institute Polytechnic Cavado and Ave/Technological University of the Shannon (TUS)
RUN-EU Research Area Cluster	RA 4: IOT and Cybersecurity

**Brief Description of the Research Project:**

To create a Smart Diagnostic Aid for Audiologists which uses Brain Evoked Auditory Potentials (or Brain signal data) and classifies a patient’s data as Normal or Abnormal and helps with Hearing Aid Prescription. There are several EEG (Brain Wave) datasets available online for research. Once a promising architecture and configuration has been established with the use of multi-channel brainwave data, the research can then move into the next phase: the application of the technology to Brain Evoked Auditory data. Successful application should see the technology act as a Diagnostic Aid which will help Audiologists classify their patients BEAP data. This can in turn be utilised in the programming of Hearing Aids.

## Research & Innovation Project Case Study 16

Project Title	Knowledge Circle
Project Acronym	N/A
Funding Call	Call nbr 04/SIAC/2021 – Knowledge Transfer
Award Value	484,900.63 €
Grant Agreement Number	POCI-01-0246-FEDER-181295
Start Date	01/07/2021
Term	30/06/2023
Co Ordinator or Partner	Polytechnic Institute of Leiria
RUN-EU Principal Contact Person	IPCA: João Vilaça, António Rocha IPLeia: Eduarda Fernandes, Catarina Ferreira
RUN-EU Participants	Polytechnic Institute of Cávado and Ave (IPCA); Polytechnic Institute of Leiria (IPLeia)
RUN-EU Research Area Cluster	RA 7: Education & Social Sciences

**Brief Description of the Research Project:**

The aim of the knowledge transfer project is to value and transfer knowledge and technology to organizations that can benefit from the application of research and development results generated by researchers and research units at the Polytechnic Institute of Cávado and Ave and at the Polytechnic Institute of Leiria (project leader).

The project has created a network of partners to foster the dissemination and promotion of research results, including, assessment of technical solutions market potential, identification of investment opportunities for new development stages, support spin-off companies' creation, and to facilitate access to companies to develop experimental and pilot projects.

The project is also developing awareness and training actions for students, researchers and professors to develop skills within the scope of intellectual property rights and business initiative, and organizing vouchers call to support researchers and research teams in the valorization of research outcomes with high value and potential economical return.



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