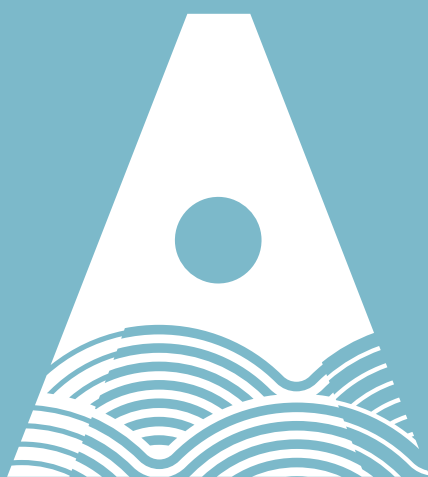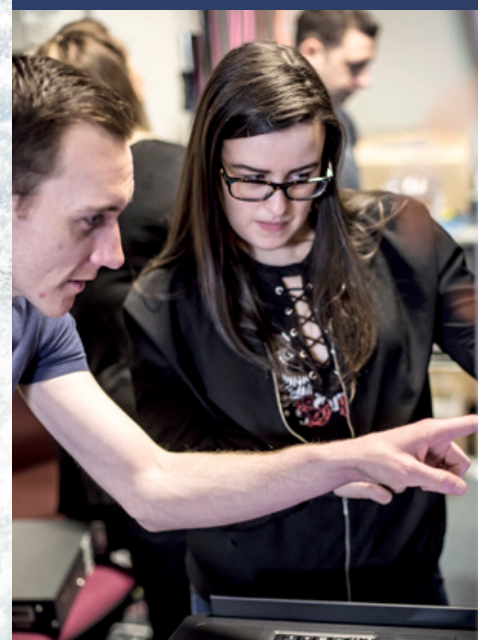# Operations and Supply Chain Research (OSCAR) Programme

Ollscoil Teicneolaíochta an Atlantaigh

Atlantic Technological University

atu.ie

OSCAR Postgraduate Research Training Program

15 research scholarships are being offered across a number of disciplines to commence in 2022.

Project awards will include:

- A student stipend (usually tax-exempt) valued at €16,000 per annum
- Annual waivers of postgraduate registration fees
- Extensive research training programme
- Support for travel, consumables and dissemination expenses

The Operations and Supply ChAin Research (OSCAR) postgraduate research training programme is a multi-disciplinary programme that focuses on training, developing and disseminating knowledge in operations and supply chain management domain, as well as advancing managerial practices through close interactions with various industries and agencies.

This programme aims to achieve a transformational change in enhanced valued added job creation within the new manufacturing and service paradigms in Ireland. These new paradigms will involve manufacturing and services that use innovative technologies at all levels to embed expert knowledge, make decisions, augment processes, develop new products/services and ways of doing things and integrate manufacturing and service processes / supply chains. To achieve this transformation, we will harness the expertise from within our proposed programme, as well as industry at regional and national level.

Our vision is to become a centre of academic excellence in operations and supply chain management to nurture graduates as future leaders by leveraging the knowledge and expertise of its academics and extensive network of agencies and industry partners.

Stage 1 Year 1

- Induction
- Personal Development Plan
- Certificate in Research Practice and additional research training
- Research Carousels

Stage 2 Year 2 & 3

- Doctoral Seminar on Research Methodology in Operations Management
- Doctoral Summer School
- National / International Conference
- International Research Exchange

Stage 3 Year 4

- Publishing Workshop
- Early Career Seminars
- PRTP Annual Conference

Project Titles

1. Entrepreneurial orientation and its impact on social sustainability: The role of organizational learning

2. Supply chain innovation and sustainability performance

There is a deficiency of research on social sustainability in relation to corporate entrepreneurship. This is surprising, given that when sustainable practices fail, entrepreneurial activities often provide solutions to these failures. The increasing importance of sustainable development creates challenges and risks, that can be turned into new avenues for corporate entrepreneurship and innovation. Despite the importance of corporate entrepreneurship and innovation for success, many organizations struggle with effective strategies to initiate activities among their employees.

Entrepreneurial orientated (EO) firms invest resources to innovate by developing internally their operational practices and

processes, as well as by nurturing organizational learning (OL). Conceptually EO fits well with OL, as firms that have an EO will seek to develop new processes and practices, from within the organisational boundaries. This allows them to overcome the learning barriers created by their internal sources of innovation and highlights the importance of intra-firm collaboration as a mechanism for improving social sustainability.

Through a comprehensive literature review, a number of research hypotheses and a conceptual framework will be developed. The hypotheses and the framework will be statistically evaluated and discussed in terms of policy and managerial implications. Data for this study will be collected from

service and manufacturing firms on the island of Ireland. This study will contribute to the literature on corporate entrepreneurship, innovative behaviour, entrepreneurial orientated firms, organisational learning and disseminate several theoretical and practical implications.

Firms who demonstrate an ability to innovative outperform competition in terms of sales growth, financial performance, and employment. Over the past 30 years, how to manage innovation successfully is of keen interest to academics and practitioners. Innovation management is now referred to as a managerial skill and should be executed as such. The competition has moved from company to supply chain (SC) level, and firms use SC capabilities to outperform their competitors. SC innovation has received increased attention within the SC management domain, due to its potential to impact sustainability performance, effectiveness, and operational efficiency.

Recent studies have highlighted three main SC innovation activities:

marketing-oriented innovation activity (MOIA), technological-development-oriented innovation activity (TDOIA), and logistics-oriented innovation activity (LOIA). There is a lack of empirical research that investigates the impact of such activities on sustainability performance. Studies have measured the impact of individual activities, however no study to date has taken a holistic approach and measured the impact of all three on the SC sustainability performance.

This study will contribute to the SC literature by developing a complementary and multi-dimensional conceptualisation of SC innovation and will empirically assess the impact on sustainability performance. From a practical

perspective, the conceptual framework will enable SC managers to better understand the SC innovation and evaluate the degree to which investments in innovation impact organisational outcomes. Moreover, it will provide insights as how SC innovation enables companies to improve their sustainability performance.

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3. The impact of social media analytics capability on supplier selection effectiveness

4. Graph-based analytics for complex supply chain management systems

A nascent body of literature has highlighted the role of social media in operations and supply chain management (OSCM). As the popularity and value of social media in relation to OSCM becomes increasingly evident, limited attention has been received in research. While traditional operations management is based on scientific management, standard procedures and formal documentation, social media activities tend to be informal, unstructured and less controllable. Social media research is beginning to emerge in the top OSCM journals, yet additional research to advance our understanding of the role of social media in OSCM is necessary. Several studies have highlighted that the role of social media in the management of supplier relationships represents a primary research area. Social media presents the opportunity to create information-rich networks between companies and suppliers wherein information can be shared in a timely and objective manner, enhancing communications and relationships as a result. The use of social media can provide a means of communicating customers real-time interests and changing needs to suppliers. Thus, the development of social media analytic capability, is necessary.

Recent studies have sought to assess the role of analytic capabilities in enhancing organisational performance, in line with the internal and external factors necessary to achieve this enhanced performance. The effective integration of social media data is facilitated by the development of a high OSCM social media capability. However, the extraction, analysis and interpretation of social media data represents a challenge. Thus, it may be inferred that the development of an OSCM social media capability represents a challenge. Given the centrality of social media in the selection of suppliers and management of supplier relationships, the development of a social media analytics capability allows social media data to be managed such that associated benefits may be achieved. Therefore, the objectives of this study are to develop a framework measuring the level of social media analytics capability within a company; to investigate what mechanisms can enhance the social media analytics capability; and empirically measure the impact of social media analytics on supplier selection and supplier relationship management.

Recent events such as the war, Brexit, biodiversity, and the Covid-19 pandemic have led to negative consequences for firms, thereby affecting the consumer. The supply chain encompasses the complete value chain from sourcing, manufacturing, and distribution to logistics. Supply chain management is subject to various challenges, such as synchronization, real-time data visibility, irregular reviews of stock levels, and production line imbalance resulting in asset underutilization. Recent advancements in big data analytics have accelerated the new means of arriving at precise predictions that reflect better customer demand while minimizing the cost of supply. Supply chain analytics (SCA) aims to improve the operational efficiency and effectiveness of data-driven decisions to address the above challenges at various levels including strategic, operational, and tactical. To cope with these challenges, it is critical to rethink SCA to cope with extreme conditions using data-driven intelligence to the business, reducing the overall cost to the consumer while improving service levels.

Existing literature focuses on statistical analysis techniques to forecast demand in SCM using time-series analysis and regression analysis. Modern supply chain management systems are expensive and complex networks with inherent dependencies and dynamicity, making management of these networks challenging. Current efforts to supply chain analytics do not consider the dependencies/ relationships that exist in complex supply chain management systems and are not effective for complex SCM systems. In contrast to existing literature to supply chain analytics, this project will model the complex supply chain management using a graph model to show the dependencies/relationship for an accurate overview of the entire supply chain network. The project also aims to propose various graph-based deep learning approaches for important predictions that are critical at the strategic, operational, and tactical levels to improve the entire SCM value chain.

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5. Industry 5.0 and lean practices: A new paradigm?

Industry 5.0 or the fifth industrial revolution is focusing on delivering personalised products and services, by harnessing a better interaction among humans and machines. This new era provides a new approach to personalization, and it aims to solve complex problems. Lean implementations have been successful, and the operational benefits are well established. However, with the advent of digital technologies, there is a lack of research that examines their impact on lean manufacturing. Researchers have raised the integration issues of Industry 4.0 in lean implementations and there is a scarcity of empirical studies as to how they support lean principles and add value to the process.

Recent studies have highlighted the need to reimagine the future production systems and investigate how to use technology to connect the workforce to the new digital advancements. One key pillar of lean manufacturing is focusing on people, therefore understanding the positive and negative impacts of such digital tools on the attributes of their work is paramount to a successful implementation. Managers must be cognisant of the implications of deploying new technologies and their interaction with lean manufacturing.

The proposed study will explore how the industry 5.0 can connect humans and new technologies, to achieve synergies and contribute to

enhance operational performance. From a practical perspective, this study will inform managers as to how the industry 5.0 can enable the lean implementation and the supports required to improve the operational performance.

6. Innovative sustainable urban last-mile logistics on e-commerce market: a case study for Ireland

Last-mile logistics refers to the final step in the delivery process of physical goods from the last transit point to the final drop point of the business-to-customer supply chain. This critical step faces the dual challenge of fulfilling the requirements of globalised trade while addressing high inefficiencies associated with delivery costs and transport externalities. Innovation is a crucial aspect to enable the transition from current last-mile logistics systems towards more sustainable configurations.

The European Union defines an external cost, or externality, as the cost arising when "the social or economic activities of one group have an impact on another group and when that impact is not fully accounted, or compensated for,

by the first group". The increase in e-commerce in the last few years, with a worldwide growth rate of 23.3% in 2018 has further accelerated since the Covid19 Pandemic. This means greater parcel volumes that need to be delivered each day requiring more delivery vehicles.

Previous research on last-mile logistics has identified several innovations able to reduce transport externality costs such as innovative vehicles (electric vehicles, autonomous vehicles, drones, and cargo bikes), proximity stations or points, collaborative urban logistics, optimisation of transport management and routing, and innovations in public policy and infrastructures. The implementation of each type of innovation can

be viewed from three different perspectives represented by the various stakeholders involved. From the demand side, represented by individual customers and companies or institutions, from the supply side, represented by CEPs (courier, express and parcel companies), producers and online shops, and from a policy/regulatory perspective, represented by local authorities (Bandeira et al., 2018). The aim of this project is to analyse the behaviour of Irish supply-side e-commerce stakeholders towards innovative last-mile logistics solutions from a sustainability perspective.

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7. A Practical Methodology for Implementing a Circular Economy Business Model in Irish Furniture Manufacturing SMEs

Climate change is a reality which can no longer be ignored. In an attempt to halt the rate of accelerating climate change, the European Union (EU) has considered various measures, including the European Green Deal, the blueprint for how the EU will achieve its goal of being climate neutral by 2050. To achieve this goal, the EU intends to transition from a linear to a Circular Economy (CE). Ireland enacted its own legislation called the Circular Economy Act in September 2021. It includes sectoral binding targets to reduce waste and emissions, and although strong progress has been made, Ireland is lagging behind in the re-use of recovered materials in the manufacture of new products. A lack of consumer awareness of CE principles and a reluctance of businesses and consumers to invest in circular products or services means there is stagnation in the push-pull relationship between these products/services and consumer demand.

The furniture industry in Ireland is relatively mature and is adapting to many challenges. It is engaged in a digital transformation process, while also dealing with the consequences of Brexit, global supply chain difficulties and a shortage of skilled personnel. Transitioning to a CE Business Model (CEBM) is seen by companies in the sector as another complication which ranks low on the list of items that require immediate and urgent attention. While the CE principles have been discussed by the industry, clear and specific guidance on the practical steps that furniture manufacturers can take to implement a CEBM are missing. The industry needs to prepare itself so that it can play its part in helping Ireland achieve its international legal commitments. Education and knowledge are key, but the CE is a broad and complex subject. This project aims to address the lack of clarity on CE in Irish furniture manufacturing companies, particularly SMEs, and to create a methodology that will help them implement a CEBM.

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8. Sustainability Learning in Multi-Tier Supply Chains

Global, multi-tier supply chains are characterised by increased interdependence among partner organisations. Extant literature has emphasised the role of learning within supply chains, as the partner companies engage in information sharing, knowledge gathering and development for learning and innovation. These learning processes take place because supply chain players have to develop new capabilities and learn together to address environmental challenges and facilitate cooperation and collaboration.

However, while the literature acknowledges the importance of supply chain learning processes for enhanced performance, it is still unclear whether and how the supply chain partners benefit from investment in supply chain learning, particularly because while partner organisations are interconnected and have common goals, they might also have conflicting interests. Furthermore, the effectiveness of supply chain learning is highly dependent on existing supply chain network structure, governance mechanisms and the specific processes employed by supply chains to collectively learn.

In the last decade there has been increased pressure for companies around the world to become more sustainable, and consequently the need to incorporate sustainability into organisational values, goals, mission and practice has become paramount. This also implies the transformation of an organisation's traditional supply chain management into sustainable supply chain management, which requires multi-tier supply chain partners to learn sustainability-related knowledge. Currently, there is limited research in this area, and we lack a solid and nuanced understanding of the complexity of supply chain learning, where supply chain dynamics may enhance but also inhibit sustainability trajectories.

This project aims to investigate the structures, mechanisms and capabilities required to promote and support sustainability-related learning in multi-tier supply chains.

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9. A Prescriptive Model for Integrated Decision Support Systems in Industry 4.0 and the Circular Economy

While there is potential to utilise Industry 4.0 technologies to achieve CE related targets with a significant research agenda identified, there is limited research on the development of formal decision-making models and tools for integrating innovative digital technologies used in enterprise resource planning. Industry 4.0 technologies such as the Internet of Things (IoT), cyber-physical systems (CPS), additive manufacturing (AM), and blockchains can facilitate Circular Economy (CE) transitioning. However, the correct use and optimisation of these technologies and how organisations accept newer technologies associated with integrated and automated supply chains is not well understood. This research will break down the adoption process and explore the adoption, adaption and utilisation of Decision Support Systems (DSS) while developing support tools that can more effectively link these critical and emergent social, technological, and organizational factors - factors that often require multi-stakeholder, multi-organization, and multi-functional considerations.

As an example IoT, virtual and augmented reality application in remanufacturing require strategic decision models to optimize product remanufacturing. Opportunities have been identified for exploring the linkages between product life cycle, optimal remanufacturing process, and proactive application of CE innovations. These analytics can be leveraged to support decision-making during multiple product lifecycle stages. Given the interdisciplinary and "futuristic" nature of the topic, there has also been a call for more exploratory methodologies – such as Delphi studies, case studies or focus groups – to bring insights and shed light on the adoption process.

 A primary aim of this project therefore, is to explore, through qualitative research methods, this adoption process with the aid of the technology acceptance model and to distinguish the barriers and benefits to DSS in Industry 4.0 as well as prescribing a model for integration. We will conduct exploratory case study research followed by a Delphi Study or Focus Group to further examine the phenomena.

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10. Decentralized autonomous organization (DAO) supply chains: Investigating the impact of distributed ledger technologies: An innovation assimilation perspective

Blockchain enabled distributed ledger (DLT) and smart-contract technology enhance the effectiveness and automation of business processes along supply chains. The rising interest in the development of decentralized autonomous organizations (DAO) shows that DLT technology has the potential to reform how businesses conduct their supply chain operations. A DAO is an organization wherein business rules are encoded in smart-contract programs that are executed when specified rules are met.

There is a scarcity of studies that examined the impact of DLT in facilitating decentralized autonomous organizational supply chains. The assimilation of a technological innovation can often be challenging and is rarely binary. Assimilation theory posits that assimilation may intensify or deteriorate over the course of a technological innovation's adoption. Each assimilation stage describes the degree to which the technological innovation permeates the adopting company. Often the causes of innovation success or failures can be minute.

When investigating assimilation stages, a salient consideration is the degree to which we may expect an adopting organisation's progression through the assimilation stages to be linear. However, extant research has demonstrated that progression may be non-linear. We also believe it would also be an appropriate lens with which to examine the benefits and challenges associated with the adoption of blockchain and DLT in a supply chain DAO context. Although much recent research on technology assimilation has been conducted, the lines of enquiry have focused on the early stages of adoption. Therefore, the purpose of this study is to investigate factors which impede and enable the adoption of DLT into supply chains. The study will also explore how DLT assimilates into supply chains to assist them with the realization of benefits not originally conceived.
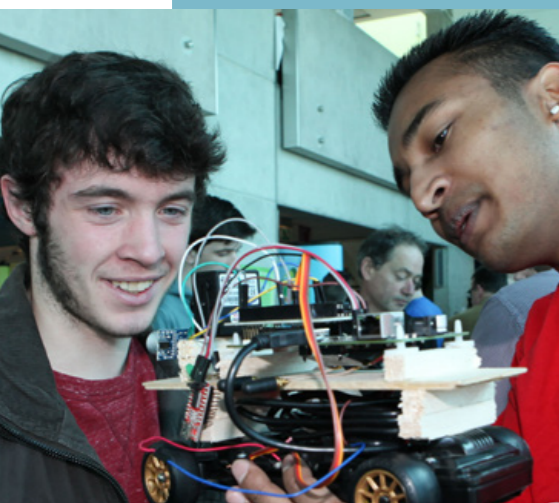
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11. An analysis of tourism supply chain management to transition to the decarbonization of the Irish tourism sector

This research will focus on how the Irish tourism sector could best transition as part of the future low-carbon economy. It will focus in particular on the effective utilization of Supply Chain Management. The research will employ indicators from the European Tourism Indicators System (ETIS) as a management tool and the Tourism and Environment Reporting mechanism (TOUERM) which act as a European reporting mechanism to monitor sustainability performance across the tourism sector. The research will identify the role of a stakeholder based decarbonising toolkit in enhancing EU ETIS sustainable tourism objectives in Ireland.

The study is key to transiting tourism to a low carbon economy and meeting the sustainable development goals. The research will obtain relevant data on climate change and reducing tourism and transport impact (Carbon Footprint Kg Co2) indicators. Preliminary desk-based research will investigate the availability of information on the various indicators held by a variety of organisations e.g., CSO, Fáilte Ireland, EPA, EEA and Local Authorities. In some instances, data may not directly available in literature for a specific indicator but will involve calculations based on available data; this was facilitated through the formulas provided by the ETIS for the calculation of data for a variety of indicators.

The research will feed back into current theory on the transiting of tourism towards a low carbon economy and findings will be shared with relevant stakeholders, including Fáilte Ireland, EPA and the wider tourism industry and will inform the development of new mitigation measures focused on decarbonising the tourism sector in Ireland as part of a transition to a low-carbon economy.

12. The impact of ethical leadership in supply chain management on customer loyalty in retail operations

Sustainability, provenance, local and ethical sourcing and circular supply chains are some of the many ethical practices becoming significant influencers in the consumer decision making process. This extends beyond the retailer throughout the supply chain which is forcing customer centric businesses to restructure their supply chains to meet changing consumer demands.

Implementation of such policies can have considerable impact on supply chains in terms of cost, supplier selection and outsourcing etc. The research aims to consider the main challenges to businesses in restructuring supply chains and the inherent advantages and disadvantages of doing so beyond meeting customer demand. In order to accurately quantify the relative impact of such initiatives, a suitably valuable and quantifiable performance metric needs to be applied. Customer loyalty is considered an important key to organizational success and profit. Firms with large groups of loyal customers have been shown to have large market shares, and market share, in turn, has been shown to be associated with higher rates of return on investment.

Invariably certain businesses and industries will benefit more from undertaking this initiative. The research will therefore, focus on the retail sector as an industry that has traditionally provided greater transparency and marketing focus on such ethical leadership practices. The outcome of this research will seek to identify a specific model or framework businesses can use to identify the relative impact of ethical leadership in supply chains on customer loyalty.
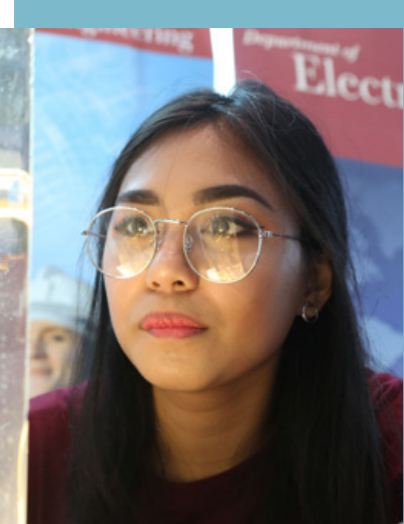
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13. The development and role of human rights and environmental due diligence in supply chain management

Over the last two decades there are growing calls for mandatory human rights and environmental due diligence legislation in the management of business supply chains, which has included the UN Guiding Principles on Business and Human Rights, and work on an international legally binding instrument to regulate, in international human rights law, the activities of transnational corporations and other business enterprises.

There is currently no legal duty in Ireland or at EU level to require companies to exercise mandatory due diligence for adverse human rights and environmental impacts in their supply chains. Within the EU some Governments are responding to regulatory demands

by providing a legislative approach to accountable supply chains that will incorporate human rights and environmental due diligence. These include the UK's Modern Slavey Act (2015), and France's Loi de Vigilance, the Transparency Act (Norwegian Act, 2021), and the German Parliament's 'Act on Corporate Due Diligence in Supply Chains' (2021).

These laws impose a binding obligation on companies to establish, implement and update procedures to improve compliance with core human rights and certain environmental provisions in their supply chains. Furthermore, the European Commission has recently proposed a draft Directive on Corporate Sustainability Due Diligence that will directly engage

business supply chains to extend beyond the risks of the company to those who are affected
While there is a growing awareness of the responsibility of businesses to speak out against human rights violations across their business supply chains highlighted in previous research and legislative developments, no similar policy and legislative progress has occurred in Ireland. Therefore, the aim of this project is to clarify the potential of Ireland's regulatory regime to oversee the degrees of influence of Irish business supply chains to avoid the commission of human rights and environmental violations internationally.

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14. An analysis of the Irish hotel sectors sustainable operations for the growth in robots, artificial intelligence, and service automation (RAISA)

This research will focus on an analysis of the hotel sectors Sustainable Operations Management for the expansion and growth in Robots, artificial intelligence, and service automation (RAISA). This emergent research will explore the use of RAISA currently being applied in tourism, and how the continued use and development of such technologies will impact on tourism sustainable operations in Ireland. RAISA has the potential to provide a wealth of opportunities to both the tourism and hospitality sectors by improving product delivery, ensuring consistency and by transferring processes to the customer.

The advancements in information and communication technology

are said to have led to increased customer experience and service efficiency. Other technologies that may affect sustainable operations and service automation includes self-driving vehicles, 3D printing and robotics, all but to name a few. This research will explore the use of RAISA currently being applied in the sustainable operations management in the Irish Hotel sectors, and how the continued use and development of such technologies will impact on the sustainable operations management.

RAISA has the potential to provide a wealth of opportunities to both the hotel sector by improving sustainable operation management in relation to product delivery, ensuring consistency and by

transferring processes to the customer. Although there have been technological strides in the development of RAISA in recent years, there has been very little focus on how these developments will affect sustainable operations management in high contact service industries such as tourism and hospitality, especially its effects on a tourism dependent economy such as Ireland. This research aims to narrow this gap in research by identifying the current uses of RAISA in Sustainable operations management by the Irish Hotel sectors and to provide strategies for the adoption of RAISA by companies in the hotel sector in relation to sustainable operations management.
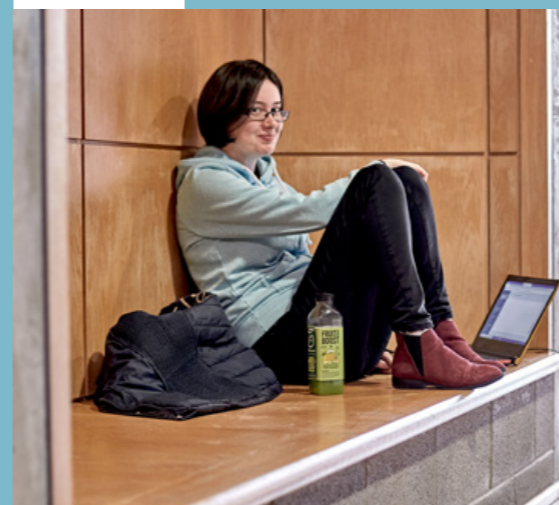
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15. Balancing the digital and green transitions for firms on the path towards Industry 5.0

In the era of Industry 4.0, the importance of alliance knowledge acquisition as the driver for digital transformation increased. Industry 4.0 led to the digitisation of physical assets, business models, and the integration of digital ecosystems with value chain partners. To a large extent as a result of the COVID 19 pandemic, which accelerated many organisations' digital transformation, the importance of Industry 5.0 as a topic warrants further investigation. Industry 5.0 is centred on firms leading the digital and green transitions through a sustainable, human-centric offering that goes beyond traditional goals of efficiency and productivity. The emergence of Industry 5.0 across Europe represents a maturation of the digital transformation of Industry 4.0.

The European Commission (2020) has recently outlined their digital strategy for 2021-2030 with the goal of supporting every European citizen, to enable business to grow all while pursuing the region's target of becoming climate neutral by 2050. A major pillar of this 'Digital Decade' strategy is to build a fair and competitive economy where and 90 per cent of SMEs have a "basic level of digital intensity" by 2030.

A new industry paradigm necessitates research exploring how firm operations are poised for achieving the dual objectives within the digital and green transitions. In particular, much is still unclear about what complementarities and trade-offs exist for firms that make progress in either the digital or green. The insights of this study will have wide-reaching consequences for understanding firm operations and their future readiness. This research will commence with an exploration of key academic literature to identify relevant knowledge gaps in how firm operations have developed alongside industry trends. It will conduct empirical research to understand how firms can adapt their operations to conform to international trends and identify existing barriers to achieving multiple objectives. It will develop a framework for how firms can transform to thrive in the modern economy.

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Requirements/ Qualifications

An Honours Degree (minimum 2.2, but 2.1 or higher is desirable) in the relevant business/ computing/engineering disciplines.

PROJECT DURATION:
48 months (PhD)

APPLICATIONS:
All documents must be sent to cawley.veronica@itsligo.ie.

Application Form / Terms of Conditions can be obtained on the website: www.itsligo.ie/oscar/

The closing date for receipt of applications is 5pm, (GMT) 6th June 2022. Applicants will be called for an online interview (shortlisting may apply).

PLEASE NOTE:
Candidates from outside the EU are eligible to apply but may be expected to provide evidence of sources of additional funds to cover living expenses for the first month in Ireland.

If either English or Irish is not the applicant's first language, evidence of English language proficiency is required for registration. Applicants must have attained a minimum of IELTS 6.5 or equivalent, due to the very high academic writing standard required for postgraduate qualifications through research.