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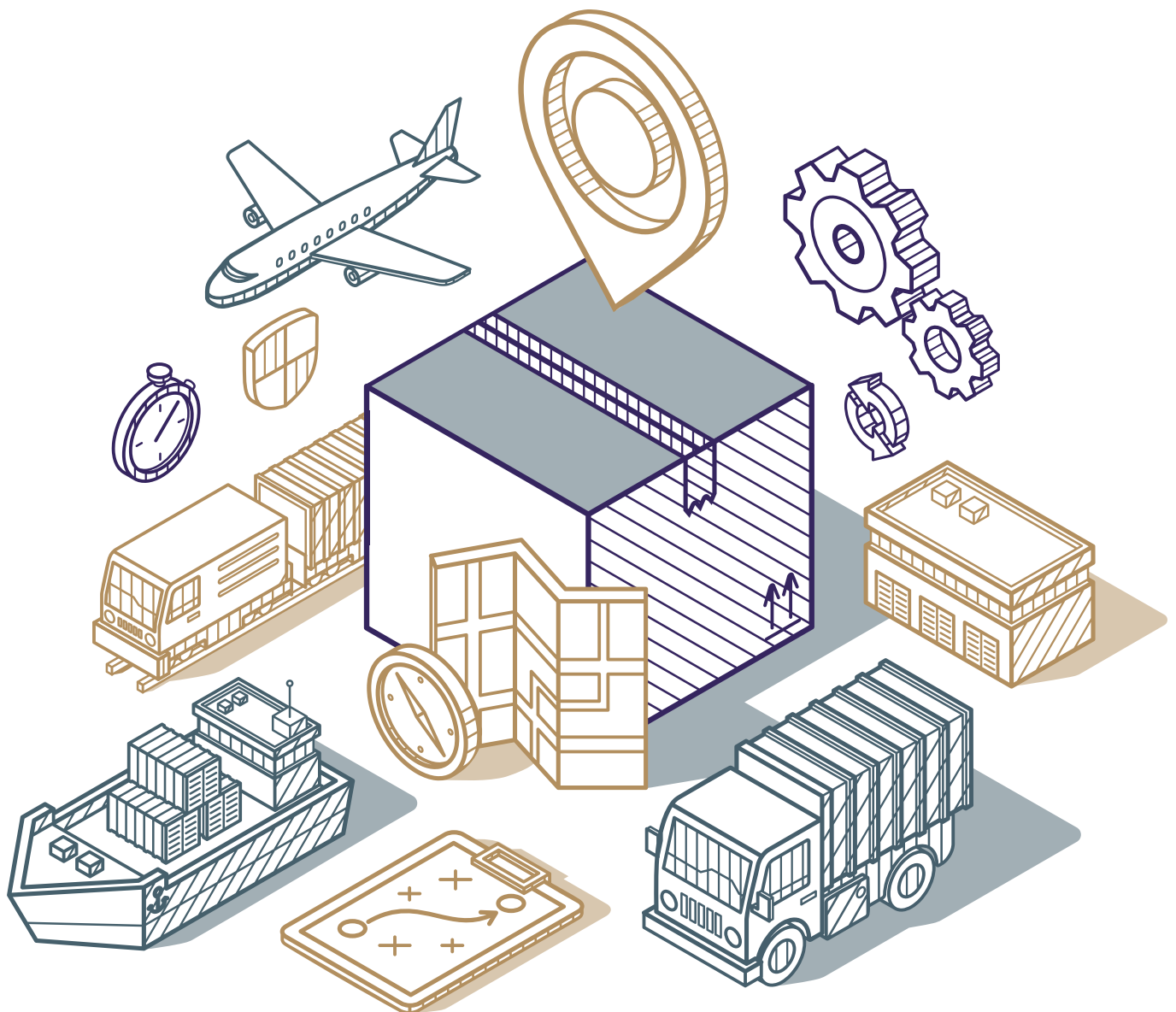
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e-LRN 2020 Special Web Conference

*Sustainable and resilient supply chains
during crises*

9 - 11 September 2020



ABSTRACTS 2020

THE LOGISTICS RESEARCH NETWORK (LRN) IS AN INFORMAL NETWORK OF LEADING ACADEMICS, RESEARCHERS AND PRACTITIONERS SUPPORTED BY THE CHARTERED INSTITUTE OF LOGISTICS AND TRANSPORT.

LRN's main objective is to facilitate the generation, promotion and dissemination of relevant research to professionals working across all sectors within the supply chain.

The e-LRN 2020 Special Web Conference is based upon accepted abstracts and is an opportunity to meet and share research, and discuss sustainable and resilient supply chains during times of crises.

For further information about this year's LRN Conference, please visit ciltuk.org.uk/LRN2020.

The Chartered Institute of Logistics and Transport (CILT) is the independent international professional body for individuals and organisations associated with logistics and transport. It has over 33,000 members across more than 33 countries worldwide.

The CILT provides the knowledge, networks and know-how for individual and collective success; it is the essential professional body for talented leaders and organisations that create, manage and operate logistics, transport and supply chain capabilities

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"Together, we are creating change for our profession. By working together, by speaking to each other we can achieve excellence for the profession for many years to come."

PROFESSOR EDWARD SWEENEY FCILT



The Chartered
Institute of Logistics
and Transport

The Logistics Research Network (LRN) is an informal network of leading academics, researchers and practitioners supported by The Chartered Institute of Logistics and Transport.

Welcome to e-LRN 2020!

On behalf of the Organising Committee, it is my great pleasure to welcome you to the 25th Annual Conference of the CILT(UK) Logistics Research Network hosted by Cardiff Business School.

The conference theme of "Sustainable and resilient supply chains during crises" emerged at short notice following the recent worldwide lockdown due to the ongoing COVID-19 pandemic and the significant logistical implications. While we originally planned for LRN 2020 to be physically held at Cardiff University, with a theme aligned to the Business School's Public Value ethos, which has now been postponed to 2021, we had to determine the best way to proceed given the uncertainty that we all face.

With 120 abstracts finally submitted the Organising Committee realised that there was a desire from our (inter)disciplinary community to 'carry on', although appreciating that not everyone can do so with many colleagues and friends facing extremely difficult circumstances. Serendipitously, by early 2020 we had already confirmed keynote speakers and a complement of specialist streams. Hence, with a high degree of commitment from all those involved, and flexibility and agility to adapt to the changing circumstances, we are able to offer an online opportunity for our 'logistics family' members to share their latest research and practices, get feedback and questions to enhance their activities and to have a shared understanding of the challenges faced during a crisis and learn about ways to prepare and respond to the 'unforeseen'.

I am extremely grateful for everyone's forbearance in the run up and during the conference.



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We can only all do our best to help support each other, including understanding when activities do not fully meet expectations or when we are unable to achieve the goals we had previously set. Hence, a big thank you to everyone who has submitted abstracts, those who are participating in the conference and the Organising Committee members, from Cardiff Business School and CILT(UK), who have made e-LRN 2020 possible.

We have an exciting variety of keynote speakers from practice and academia. It is wonderful that they are still able to participate in the conference, to share their thoughts, experiences and findings related to sustainability and resilience, as faced by the private, public and third sectors.

We have a range of Special Streams involving teams that cross disciplinary and national boundaries. Having such Special Streams is an innovation for the LRN Conference, which has greatly enhanced diversity and inclusivity, with many new faces joining us for the first time. So, a big thank you to the Special Stream leads for their passionate procurement and review of abstract submissions. In addition, we have regular streams, chaired by members of the CILT's Logistics Research Network Committee, who have fully supported the e-LRN 2020 endeavour.

Learning from last year's conference held in Northampton, which had strong industry engagement, another innovation this year is the integration of the 4th iLEGO webinar into the conference schedule. Hence, the overall conference has a rather different look, with all the streams held on the morning of the first day with iLEGO in the afternoon. The main event on the second day, in two 90-minute slots will allow for keynote speaker presentations and reflection by leads and chairs on the significance of their stream topics on sustainability and resilience during times of crises. The annual PhD workshop will then be held on the last day. Mindful of everyone's wellbeing, and the dangers of video conferencing overload, each conference slot is as succinct as possible and is facilitated by Cardiff Business School's Executive Education Team to maintain integrity.

I hope that everyone finds the e-LRN 2020 Conference of interest and benefit. I am looking forward to seeing old friends and new in Cardiff for LRN 2021. In the meantime, I hope you stay safe and well.

Professor Mohamed Naim FCILT (Chair) on behalf of the e-LRN 2020 Organising Committee

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CONSTRUCTION LOGISTICS FOR THE CIVIC GOOD

COLLABORATION WITH SUPPLIERS IN CONSTRUCTION SUPPLY CHAIN PLANNING: ANALYSIS OF DIFFERENT APPROACHES TO WASTE REDUCTION

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Purpose
The purpose of this paper is to examine the contribution of different approaches in improving collaboration in supply chain planning to reduce waste within the supply chain (SC) of industrialised housebuilding (IHB) companies. Construction SC are frequently criticised for their inefficiencies and poor forward-looking planning processes (Thunberg and Fredriksson, 2018; Vrijhoef and Koskela, 2000). The project orientation of the building process causes a multitude of planning levels responsible for specific parts in the order fulfilment process. Waste occurs due to their weak coordination within the SC and between management levels (Ellegaard and Koch, 2012). For example, design decisions in the first project phases reduce the number of potential suppliers for purchasing and restrict logistical operations. In order to avoid losses, robust calculations and time schedules are developed for single projects, which contribute to disguise existing waste (Thunberg et al., 2017). However, lots of construction companies and suppliers recognised the need to improve the efficiency of construction SC through an improved collaboration in SC planning, to avoid being outperformed by competitive SC. Different approaches are possible in improving collaboration. Within this work, two approaches, (1) a continuous improvement approach initiated from an IHB company and (2) a supplier push approach are evaluated.

Research Approach
Two case studies within different IHB supply chains delivered the data for this work. Both case studies were conducted applying an action research approach. The first case study, where an IHB company involved their suppliers with a continuous improvement approach in their supply chain planning activities, was conducted from 2015 to 2016. The second case study, with the supplier push approach, where an IHB company and a system supplier agreed to reduce waste occurrence for a specific product category, was conducted in 2019. In both cases, data from the existing SC processes were collected and subsequently structured with business process modelling. Qualitative interviews served as the primary data source to understand purchase, commissioning, supply, storage and production processes. These face-to-face interviews were conducted with managers from various levels from the IHB company and their suppliers. Business process modelling enabled structuring and understanding these processes as well as helped identifying improvement potentials. Improved SC processes were also documented, and the second round of qualitative interviews delivered data from the improved state and the process of supply chain planning. The business process models and data gathered applying qualitative interviews were finally used to assess both approaches with a SWOT and a causal loop diagram analysis (CLD).

Findings and Originality
The first case study provided an example where continuous improvement within an IHB SC was applied to identify and eliminate resource and time waste. The initiative was introduced from the IHB company to work on SC topics selected by their management. Suppliers, relevant for these topics, were invited to work in group work settings together with IHB companies' employees on these topics to develop scenarios for improvement. Within the second case study, a system supplier of an IHB company identified resource waste within the interfaces of both companies. In this case, a working group with a manager from each company and two academics was formed. The identification of specific problems was mainly based on interviews with managers responsible for the different activities of order fulfilment processes. The following part presents an extract of the SWOT. In the first case, strengths were identified in the great number of identified improvement potentials and the realistic assessment of the contribution of developed alternatives for the SC. As an essential weakness, the great effort in time for suppliers and IHB companies' employees was noticed. This weakness is connected with the risk to keep the motivation for suppliers to participate in working group meetings. Opportunities have been identified in the improvement of the cooperation in the whole SC, due to improved communication. The second case revealed strength in the target-oriented work on reducing waste in a specific part of the cooperation between a supplier and an IHB company. Assessment of the relevance of the selected topics for improving the SC was seen as a weakness, as potentially insignificant problems were selected. A threat was identified in an increased influence of a specific supplier on the SC, resulting from its incorporation in the SC planning activities. The CLD helps to better understand the behaviour of involved groups on a systems level and influences on those groups for both approaches. It enables a target-oriented controlling and management of initiatives for waste reduction on SC level.

Research Impact
The contribution of this paper is to provide further evidence of the collaboration between IHB companies and their suppliers in supply chain planning. Special emphasis has been placed on reducing waste in the supply chain. The basis for the more deliberate application of the two SC planning approaches is to be provided by analysis using SWOT and CLD. Furthermore, the benefit of a CLD analysis for the systemic analysis of such issues is shown. Future research is needed to verify findings from the two approaches. Additionally, presented approaches need to be supplemented by further cases with different approaches of collaborations in construction SC planning activities.

Practical Impact
The results of the research serve to consider useful strategies for the involvement of suppliers in the planning of the supply chain. At the same time, a systemic view on the effects of the different strategies is provided.

Keywords
Construction supply chain planning, supplier collaboration, waste reduction

EXPLORING DATA FROM CONSTRUCTION LOGISTICS SOLUTION FOR MEASURING LOGISTICS PERFORMANCE

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Purpose

Various authors have reported difficulties in implementing logistics in construction (Dubois and Gadde, 2000, Saad et al., 2002, Bankvall et al., 2010, Cheng et al., 2010). A main reason is the difficulty to show, with real figures, the effects of different logistics solutions, which in turn is a result of lack of data. With the traditional way to organise logistics there is neither any systematic data gathering, nor any demand on following up the logistics in construction projects. However, with the phenomenon of construction logistic solution (CLS) and the minimum service included in a CLS is a booking system (Fredriksson et al., forthcoming) electronic aggregation of digital information has become available. The purpose of this paper is to increase the understanding of how to make use of the data gathered through the booking system of CLS in order to measure logistics performance.

Research Approach

The research approach is exploratory including both qualitative and quantitative data analysis. Data will be collected from the booking system of five CLSs in Sweden and complemented with the help of semi structured interviews. Statistical methods will be used in order to; 1) determine what performance measures that could be calculated using data from CLSs booking systems, and 2) increase the understanding regarding the use of available data.

Findings and Originality

The paper identifies which logistics performance measurements that could be calculated by the support of CLS booking system and which logistics performance measurements that need complementary data from system such as planning and order system of the main contractors. Based on the data from the booking system insights can be given regarding the transport patterns of construction projects, such as the number of transports to and from site, and the possibilities of decreasing these through improved planning and bundling.

Research Impact

This paper will act as a road map to evaluate how CLSs data can be used to measure logistics performance. This will be considered as an initial step to improve the construction logistics by using a tool of CLS.

Practical Impact

This paper will result in removing a lot of misconceptions and ambiguities that are currently acting as hurdles and obstacles towards CLS wider implementation.

Keywords

Construction logistics solution (CLS), Data quality, Construction logistics performance



BLUEPRINTING CONSTRUCTION LOGISTICS SERVICES TO ENABLE QUALITY IMPROVEMENTS

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Purpose

The multi-actor and temporary, project-based nature of construction logistics services pose a challenge to an improvement- and customer-oriented focus – making the responsibility for improvements unclear at the same time as these services showcase large inefficiencies. The construction sector is thus challenged to balance customized, often unique projects and efficiency improvement of operations through standardisation. The purpose of this paper is to support quality improvements of construction logistics services by using a service modularity approach to identify services to prioritize for improvement work. The purpose is addressed through an application of service blueprinting at a construction logistics service provider.

Research Approach

An exploratory research approach has been applied, and empirical data has been collected through semi-structured interviews, meeting participation, and documentation. Sampling for interviews was based on identification of various actors engaged with construction logistics services. For the application of the service blueprint, one construction logistic service provider offering modularised services was sampled. Analysis was based on the service blueprint and identified efficiency challenges.

Findings and Originality

This study shows that modularisation of construction logistics services is a viable approach to create service offerings that can be uniquely fitted to a specific construction project, but at the same time enabling efficient operations. Moreover, modularity can be operationalised through a service blueprint as a step towards quality improvements. The improvements made will through modularised logistics services, and standardised service modules serve as “carriers of quality improvement” between the temporary projects characterising the construction sector.

Research Impact

Service modularity is defined as “the degree to which the components of a system can be separated and recombined” (de Mattos et al., 2019). This paper contributes to understand how logistics service modularity and quality improvements can be mutually enhancing in a project-based context.

Practical Impact

One approach to balancing effectivity and efficiency in the construction sector is service modularity. Service blueprinting is introduced as a hands-on tool to model a service system and is here used to prioritise which construction logistics services to focus for quality and efficiency improvements.

Keywords

Construction logistics services, Service modularity, Service blueprint, and Quality improvements



MATERIAL FLOW CONTROL IN A CONSTRUCTION SUPPLY CHAIN EMPLOYING DIGITAL TECHNOLOGIES

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Purpose

The purpose of this study is to identify drivers and barriers of the use of digital technologies to improve material flow control in a construction supply chain and to identify the effects of the digital technologies on the construction logistics performance.

Research Approach

The research method is a single case study. The case study is carried out at a large construction project in Stockholm, Sweden. The data collection methods are direct observations, participation in project and planning meetings, semi-structured interviews, and internal documentation from the participating companies. The digital technologies that are employed by the contractor company are Bluetooth QR-code etiquettes, mesh routers, a smart phone application, a VMI system and automatic replenishment orders, and a smart delivery container. Moreover, the authors used an ITO-perspective (individual, technological and organizational) as their theoretical lens for data analysis to identify drivers and barriers of the use of digital technologies and to investigate the possibilities to mitigate the challenges of the use of the digital technologies.

Findings and Originality

Our preliminary findings indicate the drivers and barriers for the use of digital technologies, the performance effects on the construction logistics processes as well as the key learnings from the use of digital technologies for the contractor company. The identified drivers, barriers, and effects are related to the following order-to-delivery and on-site logistics processes: contractor company order planning and order placement, as well as goods reception and on-site handling. The effects could be illustrated by analysing a number of logistics factors, such as stockout levels, inventory levels at site, number of deliveries to the site, average time for accessing the material, coordination of logistic processes, time for tracking damage/theft, and construction crew's stress level.

Research Impact

The main contribution of this paper is identifying the drivers and barriers of the use of digital technologies in a construction project, the key learnings from the use of the technologies as well as outlining the logistics performance outcomes that come from employing digital technologies in a construction project.

Practical Impact

Employing digital technologies can increase the construction contractors project performance by eliminating non-value-added activities, and prevent delays and stockouts by automatic replenishment orders.

Keywords

Construction management, Digitalization, Logistic management



CONSTRUCTION: THE CASE OF PLASTICS RECYCLING

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Purpose

World-wide there is a push to reduce the amount of virgin plastic use, as well as finding innovative ways of managing plastic waste. Hence, we find that governments are setting high targets for plastics recycling in order to reduce the amount of virgin production. The construction sector has much promise in terms of adopting circular economy models, and in this paper we report on the results of a trial project to introduce circular economy models. More specifically, we seek to answer the research question - “what obstacles do manufacturers to the construction industry face in adopting circular economy models across the supply chain?”

Research Approach

We adopt a problem solving, interdisciplinary, design science approach working collaboratively with a manufacturer of plastic products used in construction as a high volume, mostly consumable product during the build phase. We take a systems wide perspective of the supply chain, exploiting process modelling techniques, sales data analysis and interviews of their top pareto customers, to determine material flows of the ‘as is’ situation. With stakeholders, we determine three potential ‘as could be’ circular economy models.

Findings and Originality

Barriers to circular economy include: limited specialist suppliers, the provenance of the returned plastic, cost factors, sourcing quality and consistent recycled material, end-of-use plastic products that do not have concrete-contamination, as well as lack of cost incentives. Challenges include: lack of systematic purchasing approach, limited cost drivers, quality perceptions of recycled products, limited evidence of the re-use of plastic product, no clear indicator of plastic product longevity, mixed approaches and enthusiasm towards segregation, and little enthusiasm exists to clean products on site. Space constraints, cleaning, logistics and incentives need to be considered for any proposed circular economy model. We identify 3 potential circular economy models: 1) customers return direct to manufacturer (manufacturer does all/part processing), 2) customers return direct to 3rd party processor (3rd party does all/part processing), 3) customers return to handling hubs (the hubs could be wholesalers).

Research Impact

We find that our models align with Batista et al.'s (2019) fundamental aspects of a circular supply, incorporating sustainability (the manufacturer already incorporates by-product recycling in its manufacturing processes), augmented design complexity (the models adopt restorative processes and manufacturing forward flows), downstream design (the encourage restorative processes with customers) and value chain composition (there are traditional and restorative supply chains with forward and reverse flows of virgin and recycled materials).

Practical Impact

We provide a cost-benefit study of the three models and guidance on their implementation.

Keywords

Reverse logistics, customer perceptions, closed-loop supply chain



A SUPPLY CHAIN PERSPECTIVE ON BUILDING INFORMATION MODELLING (BIM) DELIVERY

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Purpose

The purpose of this research is to tackle the challenges that are facing supply chain management (SCM) throughout the life cycle of construction projects. This paper will explore the effective adoption of SCM theories in the context of the architecture, engineering and construction (AEC) industry, with particular reference to the role of building information modelling (BIM) as the key enabler for efficient integration.

Research Approach

A primary mixed approach of qualitative and quantitative research will be conducted through the use of a systematic review of the extant literature followed by a survey and semi-structured interviews with key informants and some focus group sessions. The rationale behind this approach is to achieve three research objectives; first, to evaluate the current status of BIM and supply chain integration in the AEC industry; second, to investigate the barriers to supply chain integration (SCI); third, to establish a robust approach to successful adoption

Findings and Originality

This paper presents results from an ongoing research project aimed at facilitating a systematic approach to effective construction project delivery through BIM and SCI. The initial findings suggest that there is a lack of predefined supply chain benchmarks to comply with BIM requirements as defined by the specification for construction information management (PAS1192:2). Although there is an evident concurrence between the objectives of applying BIM process and the fundamentals of contemporary SCM thinking, the optimum benefits of their integration has yet to be established. Hence, the current research will elicit these synergies to promote effective BIM-SCM integration

Research Impact

The current research will provide a wider vision to researchers who are not necessarily familiar with standards and documentation associated with the implementation of BIM and supply chain integration. It will also open doors for fruitful research topics within the field for integrated BIM-SCM from different perspectives.

Practical Impact

This study provides a step change in meeting supply chain competency for successful BIM delivery. It uses an evidence-based approach aimed at leveraging existing tools, resources and documentation to facilitate the achievement of compliance with BIM level 2 requirements as outlined in PAS1192:2.

Keywords

BIM, supply chain management, integration

MINIMIZING THE CARBON FOOTPRINT OF THE HOUSEBUILDING SUPPLY CHAIN USING LINEAR OPTIMIZATION MODELLING

Purpose

This research is aimed at minimizing the amount of carbon emissions released from the housebuilding supply chain. The study further aims to demonstrate that with the right procurement model and supplier contribution, the housebuilding supply chain can significantly minimize its carbon footprint.

Research Approach

The approach used in this research follows a quantitative method by utilizing linear programming modelling techniques to determine the optimum procurement strategy for construction materials. The mathematical model aims to minimize two linear objectives simultaneously, i.e. total procurement cost and carbon emissions. The linear deterministic model does this by determining the optimal contribution needed from each housebuilding supplier, such that the cost of material acquisition and carbon emitted is minimized. The model is then applied and solved using real procurement data from a well known UK-based housebuilding firm.

Findings and Originality

Findings show that when using the optimal procurement strategy, the development of which is informed by the mathematical model, housebuilding supply chains can achieve significant carbon and cost savings. Additionally, the mathematical model provides useful insights that aid in the development of various carbon mitigation strategies for construction supply chains.

Research Impact

The research aims to contribute to supply chain management understanding by addressing a critical gap in green procurement practices within the housebuilding part of the construction industry. Furthermore, the work provides academic researchers with a novel set of methods and mathematical modelling techniques to help address the climate change conundrum.

Practical Impact

The method utilized within this research allows relatively simple and effective implementation within company policy and culture, making it very practical for organizations to adopt. Moreover, in terms of managerial implications, the research demonstrates that with the right procurement model, businesses can indeed minimize procurement cost and carbon emissions, thereby achieving a ‘win-win’ scenario.

Keywords

Construction supply chains, carbon minimization, procurement, optimization, carbon hotspot identification, linear programming





HUMANITARIAN LOGISTICS AND SUPPLY CHAIN MANAGEMENT



ANTICIPATING HOST NATION SUPPORT LOGISTICS IN 2040 FROM THE PERSPECTIVE OF THE FINNISH DEFENCE FORCES

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Purpose

The purpose of this paper is to outline how we can anticipate logistics futures in the military context in particular. The phenomenon under study is Host Nation Support from the perspective of the Finnish Defence Forces. Logistics operations management forms the core of Host Nation Support.

Research Approach

The paper is based on a literature review of the latest scientific publications on futures research and the respective theories, complemented with an overview of logistics trend research. Unclassified military publications were also reviewed in relation to the research theme. A qualitative research approach was adopted due to the emerging and evolving nature of the research topic. Content analysis was conducted with strict parameters set by the chosen keywords.

Findings and Originality

The logistics and supply chain futures studies mainly focus on identifying trends and the most likely development paths. Thus far, very little attention has been paid to weak signals, discontinuities, or unlikely but possible development paths. There is also room for drawing more detailed defence implications and conducting an impact analysis in the military environment, especially in logistics. The Futures Map particularly applies to anticipation in the military context.

Research Impact

Very few studies consider the effects of logistics trends in the military context in general, or in the Finnish operating environment in particular. With this paper, we hope to generate discussion around the theme of Host Nation Support logistics and anticipation.

Practical Impact

Military organizations should put more emphasis on developing the anticipation capability in logistics, covering developments in both business and military logistics. Enhanced anticipation capability would make it easier to estimate the required support.

Keywords

The keywords used in the paper are anticipation, futures studies, futures research, logistics, sustainment, supply chain management and HNS (Host Nation Support).



PROFIT VS. NOT-FOR-PROFIT: LOGISTICS SERVICE PROVIDERS (LSP) AND HUMANITARIAN RELIEF

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Purpose

Logistics outsourcing recently spread to humanitarian supply chains (Dufour et al., 2018). Academics thus began to explore the emergence of LSPs in the field: commercial (Cozzolino et al., 2017) or humanitarian organizations (HOs) (Vega and Roussat, 2019). Authors point out that outsourcing improves the delivery of goods (Cohen, 2016), the logistics capabilities of HOs (Bealt et al., 2016), while reducing risks (Baharmand et al., 2017). However, previous works failed to distinguish Not-for-Profit from commercial contracts in humanitarian logistics. Our research seeks to refine and expand the role that LSPs play in humanitarian supply chains based on Vega and Roussat's (2015) conceptualization and further Sigala and Wakolbinger's (2019) partial validation. .

Research Approach

Our exploratory research is a qualitative endeavor, following abductive reasoning process (Kovacs and Spens, 2005) and using a 'systematic combining' approach (Dubois and Gadde, 2002). Based on an interview guide built upon an extensive literature review, we conducted interviews with LSP identified as major players in humanitarian relief among which Kuehne + Nagel, DHL, Agility, Damco. For each company, we interviewed a contract manager or the head of Aid SBU (when it exists) and the CSR manager. The interviews were transcribed and coded using a QDAS (NVivo) in order to ensure internal validity.

Findings and Originality

First results reveal a huge diversity of situations. The prices for logistics services can go from usual commercial tariffs to pre-fixed rates negotiated on a periodic basis. Some firms use open book policies, propose price reductions or finally provide services pro-bono. The research also identifies levers justifying the choice of the pricing politics. Surprisingly, humanitarian logistics is clearly considered as a business unit, independent of CSR commitments

Research Impact

Our research contributes to the growing trend of research on humanitarian logistics as a service (Heaslip et al., 2018). Focusing on the characteristics of the relation between LSPs and HOs helps to clarify the public-private relationships and the conditions of service providing, thus completing recent works (Dufour et al., 2018). Our results also refine Vega and Roussat (2015) conceptual approach.

Practical Impact

Results can help HOs understanding LSPs' decision process and both partners better grasping the other's mindset.

Keywords

Service, Not-For-Profit, Humanitarian logistics
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SUPPLY CHAIN DISRUPTION IN A HIGH RELIABILITY ORGANISATION

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Purpose

SCM performs a critical organisational function but is increasingly vulnerable to sudden disruptions due to the accelerating forces of globalisation, climate change, technology, industrial trends, competitive intensity, and demand uncertainty. These events interrupt operations, and have a direct impact on brand reputation, consistency in earning, and ability to increase shareholder returns. The concept of Supply Chain Resilience (SCRes) balances vulnerabilities to disruptions with capabilities, including redundancy, flexibility, velocity, and visibility across phases of preparedness, response, and recovery. However, SCRes remains fragmented, capabilities are contradictory, it lacks empirical research and fails to resolve the tension between operational efficiency and effectiveness. An organisational challenge is that activities in the pursuit of resilient (effective) operations may be perceived as competing with primary customer service and efficiency-based production performance goals that are focused on generating revenue streams, and whose effects are immediately discernible.

Research Approach

This research explores SCRes within a different form of organisation, also vulnerable to disruptions, but in more volatile cannot-fail environments, who balance this tension between efficiency and effectiveness, and still maintain reliable performance. These are High Reliability Organisations (HRO) because a significant disruption can be deleterious and can have severe associated human and social costs that outweigh their value, such as the 1986 Chernobyl nuclear disaster. HROs include nuclear-powered naval aircraft carriers. A qualitative multi-case study of the Irish Defence Forces (DF) on U.N. Peace Support Operations is in progress, through interviewing 23 Logistics personnel, across management scales, based on retrospective missions and observing current pre-deployment mission readiness exercises.

Findings and Originality

This research is the first empirical study of SCRes in a High Reliability Organisation context and is being carried out for a part-time doctoral programme. Intermediate findings are that the DF share the budgetary pressures of business organisations but balance efficiency with effective SCM operations. There is a definite mitigation phase that precedes the preparedness, response and recovery phases and a cultural risk orientation across the entire organisation enables sustainable reliability. The elements of the HRO cognitive infrastructure of collective mindfulness is evident and this will enable the formation of a conceptual framework for SCRes once interviews and observations are completed.

Research Impact

This research addresses the SCRes literature calls for empirical research that focuses on medium-sized organisations with limited resources that balance the efficiency vs effectiveness tension, provides a coherent and integrated framework for phases and capabilities, and explores in an SCM context, the considerable similarities between the formative elements of SCRes and the characteristics of HROs.

Practical Impact

Understanding HRO characteristics can contribute to resolving the challenge of SCRes in business organisations. The dominant premise of High Reliability Theory is the Collective Mindfulness process. This fosters a culture of reliability from senior and middle management to operations personnel, through commitment to resilience, pre-occupation with failure, sensitivity to operations, reluctance to simplify, and deference of expertise to situational disruptions.

Keywords

Supply Chain Disruption, Supply Chain Resilience, High Reliability Theory.



IMPROVING THE DIAGNOSIS TIMES OF PATIENT SAMPLES THROUGH A MULTIMODAL ROUTING ALGORITHM

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Purpose

This paper aims to provide an insight into the business-as-usual activity of an NHS pathology network and investigate the potential for a novel vehicle fleet routing algorithm to improve the overall 'bleed-to-diagnosis' times for patients.

Current NHS pathology operations, largely using vans serving groups of GP surgeries on 'milk-rounds', can result in an inefficient throughput of sample deliveries to laboratories, meaning intervals between sample 'bleed times' and diagnoses can be significant and variable, depending on the surgery from which the sample originated. Effective workload management at the pathology laboratory can be also problematic. With the growth of the gig economy and demand for additional work, this paper also investigates the potential for lifestyle couriers to complement existing logistics with consolidation.

Research Approach

This research is based on an analysis of a significant NHS pathology dataset and related carrier vehicle route plans. The logging data covers a 1-month period in November 2018 for all (70,313) specimens originating from 78 GP surgeries which feed into the Southampton General Hospital pathology laboratory. This dataset contains details for each sample, including the time it was taken, time of receipt at the laboratory, specimen type, and where it originated. The route plans (from September 2018) cover 10 goods vehicles transporting the samples from these surgeries in addition to those from a further 26 more minor clinics. Timings and locations are provided in this dataset.

Our analysis uses statistical and visualisation methods to identify trends and relationships in the existing operation on a temporal and spatial basis. Using the origin-destination data, a new approach for routing using cycle consolidation is developed with the aim of minimising the time from 'bleed' to delivery at the hospital. Further constraints are added to ensure solutions are practical (i.e. not one vehicle per surgery).

An additional dataset from a major app-based food delivery company is used to demonstrate the potential for a pathology logistics operation to be supported by gig economy workers. This has been undertaken using 7917 job records from part of the company's London operation to understand the trends in day-to-day food delivery activity, and to what extent spare capacity exists to move pathology samples. We compare the complete results from these analyses to the business-as-usual to identify where any benefits or disbenefits are seen in terms of time, cost, mileage, and the environment.

Findings and Originality

The data provided by the NHS pathology laboratory comprises of 70,313 samples from the month of November 2018. This data has only been used in a simplified study investigating the potential for drone technology to enhance NHS service, though no work was completed in terms of optimising a multi-modal approach to do so. Additionally, minimal research has been published which covers the business-as-usual operation of an NHS pathology network. Little analysis of the route data has been carried out. Initial business-as-usual investigations indicate that the average interval between samples being taken and received by the laboratory is approximately 4.5 hours in current operations. Modelling work being undertaken has shown this can be reduced to below 90 minutes in a practical solution using fewer vehicles. Further investigations may improve this further, and the final results will be presented in the paper.

Research Impact

This research identifies a new approach to the vehicle routing problem; the algorithm is based on a multimodal vehicle routing problem, using a column-generation based heuristic. This problem features targets which are less common in vehicle routing problems, particularly where multiple modes are concerned, thus the outcomes of this research will help to develop this area of expertise.

The research will support future studies that further enhance healthcare and multi-modal logistics. The topic of operation and enhancement of healthcare pathology networks will particularly benefit from the findings of this study.

Practical Impact

This research is strongly oriented to practical applications, with the core datasets being provided by the NHS and a major UK gig economy courier operator. Any assumptions made in the modelling are made with consideration to real world restrictions and practicalities. The findings will help to support the NHS pathology network operations by providing an insight into methods which may offer benefits over the business-as-usual.



SIMULATION MODEL FOR SUPPLY CHAIN RESILIENCE IN HUMANITARIAN RESPONSE: LEARNING EFFECTIVENESS AND CHANGE IMPLEMENTATION

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Purpose

Humanitarian logistics practitioners can improve their supply chain decisions through the use of simulation models that incorporate different complexities of the environment. The purpose of this paper is to address the question of the learning effectiveness through the model. Thus, the paper examines how the simulation model can allow practitioners to increase the understanding of the supply chain system and to recognise the potential implications of their decisions.

Research Approach

The paper adopts a qualitative approach in order to study the learning effectiveness of the use of simulation model in a consulting project, which assesses the humanitarian response capacities and the level of supply chain resilience of the case organisations against various disruptions.

Findings and Originality

The paper identifies the processes of employing the simulation model in the consulting project that contribute to the learning effectiveness, including participatory scenario building, boundary and expectation setting, and data collection. The key findings also reveal how the major recommendations are shared with the organisations as well as the challenges for change implementation.

Research Impact

The paper contributes to the ongoing discussion related to learning effectiveness of simulation models in the context of humanitarian logistics and supply chain resilience.

Practical Impact

This paper provides important insights into the simulation model building that modellers and humanitarian practitioners can benefit from. The relevant discussion will inform policy- and field-level decision makers.

Keywords

Humanitarian logistics, supply chain resilience, supply chain disruptions, simulation model, system dynamics



MAKING LOGISTICS MORE SUSTAINABLE



SUSTAINABLE PACKAGING IMPLICATIONS ON SUPPLY CHAIN MANAGEMENT: SYSTEMATIC LITERATURE REVIEW

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Purpose

The purpose of this research is to examine the role of packaging in the context of circular economy and sustainability. The aim of the research is to investigate current practices of large food retailers and their initiatives to address the impacts of packaging through innovations and collaboration with consumers and stakeholders across the entire value chain. The objectives of this research include generating a deeper understanding of motivations to implement initiatives and their implications.

Research Approach

This research presents a systematic literature review and investigation of GRI reports published by the nine large food retailers in the UK that have signed with the UK Plastic Pact, while taking into consideration the challenges and opportunities posed by addressing the concept of circular economy and associated implications that have been raised by addressing plastic packaging.

Findings and Originality

Findings indicate that progress has been recorded, and that addressing sustainability and circular economy concepts represent potential solutions to the raised plastic issue in packaging. Plastic Packaging has been provided extended consideration with regards to the implications of packaging in a circular economy, as unrecyclable plastic is being removed from the supply chain.

Research Impact

The research has contributed by addressing the role of sustainable packaging in a circular economy and a recent trend analysis of sustainable packaging in retail supermarket in the UK.

Practical Impact

The authors raise questions critical to the development of sustainability and circular economy by putting forward that it is necessary to perform a systematic change for the implementation of circular economy by bridging the gap knowledge between theory and practice that ensures that sustainable packaging is developed with consideration to economy, environment and social aspects.

Keywords

Circular Economy, Sustainable Packaging, Plastic Packaging, UK Plastic Pact, Food Retail Industry

Sustainable packaging has increasingly become a major concern for consumers, governments, and businesses, who have raised the importance of reducing packaging waste, particularly plastic, which has gained renewed importance and awareness due in part to the recent increased use of single-use plastics resulting from the coronavirus pandemic. According to Plastic Pact, around 40% of plastic is used in packaging in the UK, with a large proportion of this contributed to the food retail industry, concentrated to a great degree with the prominent top supermarket retailers that account for the majority of all food sales. Rising consumer awareness to environmental protection and social impacts are resulting in added pressure on retail firms to implement sustainable initiatives in the supply chain in order to reduce negative environmental impacts and generate social value, within their operations and supply chains, while also achieving financial value. The UK has been leading by example in its push towards a plastic free policy, as the government is to introduce a new plastic packaging tax to take effect on April 2022 that is set to encourage industries to improve recyclability rates by gearing towards a circular economy. Innovative concepts incorporated in supermarket to reduce layers of packaging have also grown in popularity, as the retail industry and consumers are collaborating to adopt the 3R principles. In efforts to minimise waste and maximise product value while striving towards a circular economy, which has now become the focus of actors and stakeholders in order to achieve sustainability, the retail industry is progressively recognising the importance of publicly reporting economic, environmental, and social impacts in accordance to the GRI Standards. This paper investigates the attitudes and practices of nine major supermarket retailers in the UK towards adopting sustainable packaging practices and incorporating the circular economy concept through a review of published initiatives, as well as commitments to Plastic Pact. The paper reviews a diversity of current initiatives that discloses a variety of schemes that follow the reduce, reuse, recycle principles, including elimination of specific types of plastics and new innovation in packaging. The research reveals that collaboration among stakeholders and investment in infrastructure are key to successful implementation of packaging in a circular economy.



EXPLORING THE FEASIBILITY OF LOCALISED SOLAR ENERGY GENERATION AND STORAGE FOR EV FLEET MASS CHARGING AT A COMMERCIAL DEPOT

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Purpose

Increasing demands on transport has led to a rise in GHG emissions within the freight sector that are having a significant impact on air quality, for which electric vehicles (EVs) are a potential response. The transition from conventional to low-emission vehicles presents operational challenges within the freight sector due to charging requirements (i.e. charging time; EV range planning). This issue seems to be more crucial when freight transport operators have to rely on the availability of charging stations and grid supply, in conjunction with operating demands and schedules. The purpose of this research is to explore the feasibility and implications of localised generation of energy (i.e. solar energy) and battery storage at a commercial fleet depot for EV mass charging.

Research Approach

MATLAB software is used to develop a photovoltaic model to predict the suitability of renewable sources of energy generation and battery storage systems required for mass EV commercial fleet charging at a commercial retail site. The model quantitatively assesses the charging opportunities that arise from using such a facility. The research considers the hypothetical case scenario of mass charging a fleet of grocery EVs at a commercial depot and considers the role of battery energy storage systems (BSS) for maximising charging in line with operational requirements.

Findings and Originality

This is a work in progress that seeks to examine the charging opportunities that arise from integrating localised generated solar energy at a commercial depot; and how these new opportunities will impact transport operations and service provision. The consideration of including BSS as an option to achieve maximum benefit from solar generated energy combined with the optimum time to charge the EV fleet at depot in order to minimise the impact on transport delivery service will also be explored. The study will also evaluate the impact of this charging scenario from an economic and emission reduction point of view.

Research Impact

Several cities in the UK are introducing Clean Air Zone policies which directly impact the transport sector thus, the adoption of EVs is gaining importance to increase the sustainability of the sector. The research will determine the limitations and opportunities to utilise a commercial distribution centre for fleet EV charging; and the opportunity for solar energy generation with combined energy storage to reduce operational and logistical impacts of adopting an EV fleet charged via locally generated solar energy.

Practical Impact

This project has the potential to align the objectives of commercial EV fleet operators and distribution centre operators and landowners, with the sustainability needs of the local government agenda around clean air zones. It will provide useful insights for commercial real estate developers in regard to site planning for maximising potential solar energy generation and plans for fleet EV charging capabilities. It will also be of relevance to energy suppliers, EV manufacturers, and logistics and transport fleet operators amongst others.

Keywords

Electric vehicles; renewable solar energy, commercial fleet charging; logistics; transport operations; sustainability



RETHINKING THE 2050 LOGISTICS ROADMAP: SCOPING NEW PRIORITIES AND SCENARIOS

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Purpose

Over the first four months of 2020, the COVID-19 pandemic has had abrupt and transformative effects on daily life and the economy across the world. Within the logistics sector, the pandemic has led to sudden changes in demand and restrictions on activity. As it becomes clearer that the pandemic will not be of short duration, supply chain and logistics reconfiguration must continue, guided by public health policy. Nonetheless, the global health crisis has not removed the necessity of significantly reducing greenhouse gas emissions. Climate change is a slower moving emergency, yet its seriousness as an existential threat means it must not be forgotten while the immediate COVID-19 response understandably takes priority. The pandemic has already upended assumptions around consumer demand, policy interventionism, and industry capacity. The purpose of this research is to scope these changed assumptions, new policy directions, and revised scenarios for a roadmap to meeting the 2008 Climate Change Act net zero carbon emissions target for road freight in the UK.

Research Approach

The research builds upon a five-year Centre for Sustainable Road Freight (SRF) project modelling scenarios for the trajectory of carbon emissions from the UK road freight sector. This project centred upon quantitative econometric modelling, informed by qualitative assessment of stakeholder expectations gathered from an expert research advisory group. The final output was a series of three detailed scenarios showing the aggregate emissions impact of technological and organisational measures. Only in the most ambitious scenario, which included electrification of the trunk road network to enable use of overhead charging by articulated HGVs, could an 80% emissions reduction be achieved. In the changed context of the COVID-19 pandemic, there is a need for exploratory work to update the model's inputs around demand, policy impact, and adoption rates. This will inform revised quantitative modelling and the development of updated 2050 scenarios.

Findings and Originality

Scoping of the pandemic's impacts on the UK logistics sector is in progress. Early findings gathered by stakeholder engagement and horizon scoping demonstrate that the lockdown has forced a massive shift towards home delivery across all sectors, with a consequent struggle to increase delivery capacity safely. Many retailers have already stated expectations that this change in behaviour will last beyond the pandemic. The policy context, economic fundamentals, and social priorities are likewise shifting. This research will operationalise these changes into model inputs, so their long-term consequences for carbon emissions can be estimated.

Research Impact

The SRF 2050 roadmap project has already influenced UK government documents, including the 2019 Future of Mobility report. This further work will take the same approach to informing policy makers and industry.

Practical Impact

The aim of the roadmap project is to encourage the adoption of carbon emissions reduction measures, in order to meet the UK Climate Change Act 2008's target of reducing greenhouse emissions to net zero by 2050.

Keywords

Roadmap, Scenarios, Carbon emissions



WHAT IS 3D PRINTED FOOD AND WHAT DOES IT MEAN FOR SUPPLY CHAINS?

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Purpose

As the world's population continues to increase, a more sustainable use and reuse of our limited food resources is moving from a 'nice to have' to a 'must have' (McClements, 2019). This research investigates the notion that perhaps printing what you eat, in the quantities you require, as well as when and where you want it can assist. However, key questions and challenges all along the supply chain remain, including raw material choice and availability, technical shortcomings, safety and maintenance and legality. New supply chain configurations (Braziotis et al, 2019) will be required but what should these look like?

Research Approach

Building on previous research (Rogers and Streich, 2019; Jayaprakash, et al., 2018; Chaudhuri, et al., 2019) and using secondary sources e.g. journal publications, industry announcements, websites, etc., this paper seeks to address these issues by understanding the current state of 3D food printing supply chains. The questions that guided this exploratory research were; which food products can be printed; what are the technical parameters to ensure a quality product and who are the key SC stakeholders?

Findings and Originality

We found that there are currently a number of complications preventing wider adoption of 3DFP. These include; very low efficiency in production/lack of scalability; unacceptable post processing time is (cooking and oven drying) and difficulty in achieving the right texture and flavours (especially for more complex structures such as meat substitute products). Moreover, for some 3DFP products up to 30 variables must be set to print the food. Other issues such as safe cleaning and maintenance and legal question marks have also not been satisfactorily addressed for the mass market.

Research Impact

These findings can assist in identifying opportunities, risks and challenges of developing business models for 3DFP products. Owing to its digital nature, 3DFP is able to connect with other elements of Industry 4.0 and promises to deliver customisable nutrition in a potentially sustainable way that would be better for the planet (e.g. reduced food waste).

Practical Impact

Supply chain aspects must be better understood for 3DFP to progress from the lab (and the subject of EU funded projects) to being the basis of a viable industry. Few of the companies offering 3DFP equipment and products are currently making a profit from these activities. 3DFP needs further investment, with particular attention paid to implications all along the supply chain from farm to fork.

Keywords

Additive Manufacturing, 3D food printing; digital food; supply chains

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Omitted owing to space limitations – available from authors.



EVALUATING THE IMPACT OF ONLINE TO OFFLINE (O2O) BUSINESS MODELS ON SUSTAINABILITY – A TRANSPORT PERSPECTIVE

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Purpose

Transportation remains an inalienable part of enterprise value delivery but is also heavily associated with socio-environmental externalities. Previous studies have shown that high demand transport operations tend to create significantly more socio-economic externalities compared to lower demand transport operations, although the literature does not offer sufficient insight on how business models can impact travel demands. This study investigates the impact of the online to offline (O2O) business model on a firm's ability to control its supply chain sustainability footprint, using travel as the core unit of measure. This addresses potentially critical insight into the limitations that business models can exert on a firm's ability to effectively pursue sustainable outcomes, providing learning for both academic and practical applications.

Research Approach

The study adopts a quantitative approach to sampling and data analysis. Over 400 responses were collected from an international survey spanning the UK & China. Multinomial regression analysis was conducted to identify relationships between O2O purchase processes and travel mechanisms using SPSS.

Findings and Originality

As part of our ongoing analysis, present findings validate correlations between the supply chain control and business models, with early interpretations suggesting some evidence of constraints on a firm's ability to control or influence the sustainability footprint from the related transport operations due to the O2O.

Research Impact

The outcomes of the study extend the business model, supply chains and sustainability literature by underlining the strategic importance of business models as a core impacting element for sustainable performance.

Practical Impact

In terms of practice, our study offers some directions for policy and decision makers in terms of business model pollution costs, investments and fulfilment influence initiatives.

Keywords

Business models, Transportation, Online-to-offline.



PROACTIVE INITIATIVES FROM STAKEHOLDERS PRESSURE TO MANAGE SUSTAINABILITY IN THE ASIAN GARMENT INDUSTRY

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Purpose

In recent years, there has been a significant focus on sustainable SCM initiatives in the Asian garment industry following incidents such as the Rana Plaza factory collapse, the inhuman working conditions of Vietnam, and contamination of the local environment in India. Research related to this includes examining supplier selection processes (Nath et al., 2019), governmental responses (Yadlapalli, 2018) and how suppliers' operational issues are vital for social sustainability (Huq et al 2016). However, there is a need to also explore more deeply how existing partners can motivate manufacturers to practice sustainability in their existing businesses. The purpose of this paper is to explore the relationship between stakeholders' pressures and sustainable performance in the Bangladeshi garment industry's supply chain and which contextual factors/strategies influence the sustainability of their existing supply chains.

Research Approach

A theoretical framework informed by institutional theory is developed. This is then elaborated upon through semi-structured interviews with 20 stakeholders in the Bangladeshi garment manufacturing industry. The interviews have been analyzed through thematic analysis.

Findings and Originality

Findings show that strategy implementation through purposeful actions can represent a powerful resistance to contextual pressures and constraints, as well as being a facilitator of change in actual supply chains and their context. During the transformation into a sustainable organization, the idea of bounce back can come from stakeholders where manufacture can practice sustainability by refurbishing their existing infrastructural and production pattern while ensuring a safe and robust supply chain into actions. Further, the supply chain strategy can transform itself into a form of strategic collaboration between partners and thereby made supply chains sustainable than before.

Research Impact

Current sustainable supply chain research related to the Asian garment manufacturing industry lacks a focus upon refurbishing the manufactures' existing settings which is a great hinderance to practice sustainability. This paper starts to address this issue by investigating how or which moderating forces related to sustainable supply chain practices, particularly what factors/strategies influence manufactures' decision-making process for sustainable performance.

Practical Impact

By highlighting the difference of experts' views regarding sustainability performance, this study assists members of the garment supply chain in understanding how stakeholders can contribute towards sustainable supply chain performance within Asian manufacturing facilities.

Key words

Stakeholders, sustainable supply chain management, Bangladeshi garment industry, institutional theory, strategy implementation/transmission.



AN EVALUATION OF THE ISSUES FACED BY GIG ECONOMY WORKERS IN THE LOGISTICS INDUSTRY OF INDIA

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Purpose

The gig economy has opened up employment to many low skilled workers to get employment by taking part in the drive for last mile delivery of online shopping, food and app-based transportation. However, the rapid expansion and cutthroat nature of competition has resulted in many workers being underpaid, exploited and undervalued as employees of multimillion corporations. This paper seeks to highlight the factors which result in these outcomes and gears towards identification of practices that not only minimise the same and allow better processes to be adopted by these technologies enabled logistics businesses of the gig economy.

Research Approach

The research looks at managers of app-based logistics businesses who are first level customers in the supply chain and the second level customers who experience services of such businesses. This research is based on a qualitative study of the three main actors in this configuration the low wage gig workers, the businesses which use them to deliver products, finally end customers in this gig economy.

Findings and Originality

This paper is a work in progress which builds the theory behind 'low wage skills' in last mile logistics and how they can be enhanced using novel approaches in contrast to Transaction cost economics, resource-based theory and contingency Theory. Agency theory can be used to identify how the contrasting approaches to profit maximisation conflict with values based management and how the corporations can be enhanced by using technology led approaches to training and assistive technology to aid the gig economy workers to upskill in a short time and thereby balance the interactions between principals and their agent.

Research Impact

This paper seeks to identify the practical issues that are causing poor performance of the drivers that result in complaints which companies can ill afford in this market where margins are low and impacts on their survival. It also allows regulators to approach the labour practices of these big organisations and device policies and procedures to reduce the exploitation of these workers.

Practical Impact

This research allows companies to look at new ways to employ management of low wage workers in last mile logistics using technology, maintain high level of values and CSR, Licensing bodies can ensure they can increase barriers to bad practice by employing enhanced technology based analytics for ensuring compliance and reduce exploitation using low levels of red tape in the process.

Keywords

Gig Economy, CSR Values, Agency Theory



MAPPING AND ANALYSING VAN USAGE PATTERNS FOR URBAN FREIGHT LOGISTICS IN THE BIRMINGHAM CENTRAL BUSINESS DISTRICT (CBD)

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Purpose

The primary objective of this study was to lay the foundations of understanding freight behaviour in Central Business District (CBD) in Birmingham.

Research Approach

A mixed method approach, consisting of both qualitative and quantitative research methods, was used. Semi-structured interviews were conducted with selected local businesses and vehicle drivers. Focus group discussions were held to explore the views of key public policy decision-making bodies. This helped to generate insights into how the authorities plan to tackle the freight problems present in the CBD.

Findings and Originality

The study found that freight patterns depend on the demography of the area. Freight vehicle volumes are influenced by the types of goods being delivered and the nature of the contracts between businesses and their suppliers. Freight vehicles entering the CBD not only deliver goods but are often part of large servicing industry.

Research Impact

The use of a mixed methods approach to data collection and analysis provides a useful template for similar projects in other urban settings.

Practical Impact

The findings highlight the importance of strategic planning for freight management in public policy making bodies. This needs to embrace future freight consumption patterns and spatial planning considerations. There is a need to move away from piecemeal approaches to the development and implementation of solutions. Collaborative planning needs to involve all key stakeholders including businesses, residents and local authorities.

Keywords

Freight logistics, last mile, urban logistics, strategy, policy making



MINIMISING ENVIRONMENTAL IMPACT THROUGH CIRCULAR SUPPLY CHAIN MANAGEMENT



TOWARDS A FRAMEWORK FOR RENEWABLE ENERGY SELECTION

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Purpose

The desire for sustainable energy and reduced carbon footprint is driving global demand for renewable energy (RE). The purpose of this study is to systematically explore viable RE options in the Sultanate of Oman, examine the implementation challenges, and establish conditions that may impede performance. Findings will guide practitioners in selecting and designing a viable RE supply chain network necessary for improved shareholder value and sustainability.

Research Approach

Relevant publications were analysed to identify key RE options that will enable energy supply chain participants in the Sultanate of Oman to improve their financial, social and environmental performance.

Findings and Originality

Four energy sources, including solar, wind, geothermal, and biomass have been identified from the literature as potential RE sources in the Sultanate of Oman. Findings established that the high solar density and the strong monsoon along the country's coastline have made solar and wind the most viable RE options. Utilizing solar and wind RE resources will support the country to increase its energy security, reduce the adverse impacts on the environment, lower its carbon intensity and contribute to economic diversity and development.

Research Impact

A new framework for RE supply chain network was developed, which identifies key RE options and their impacts on financial, social and environmental performance as a guide to supply chain practitioners, researchers and policy-makers on effective RE technologies implementation.

Practical Impact

Transition to RE is vital towards the realisation of a sustainable society. Evaluating and selecting the most appropriate RE sources is key to business survival and growth, and for the Sultanate of Oman's transition to RE. Effective RE networks will address environmental challenges to support the country in achieving its sustainable economy targets through maintenance of natural capital and ecosystem, green technological innovation, reduction on environmental impacts, job creation, quality of life and maximization of investors' wealth.

Keywords

Renewable energy, Sustainability, Carbon footprint, Energy supply chain network, Cost efficiency, Financial performance.



THE REVERSE EXCHANGE PRACTICES OF PALLET AND PALLET PAD AT A BREWERY PLANT IN THAILAND

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Purpose

An effective reverse exchange of pallets can improve internal material handling in the warehouse through a supply chain (Bandoophanit, 2018; Valerio and Gnoni, 2015). Apart of the intrinsic environmental issues, cost-effective strategies are among management's top concerns; such as comparative analyses between pallet-cross-docking and take-back policies (Tornese et al., 2016); as well as single-use expendable pallets, buy/sell programs, and leased pallet pooling programs (Roy et al., 2016). One plant, a large Thai brewery (called "A"), has incorporated the use of pallets and pallet pads since their purchase in 2013. "A" had allowed six suppliers, responsible to collect and deliver empty beer bottles for reuse, to use the pallets and pads free of charge within the exchange program. Research determined this practice to cause frequent shortages and thereby tasked management to generate potential solutions.

Research Approach

A qualitative approach was adopted in the exploration of the brewery plant's pallet and pad practices. Updated volumes of pallet and pad usage were collected; and in-depth interviews, documentation, and observations were conducted by the research team with the six suppliers from January to April 2020. The results were analyzed through the content analysis method.

Findings and Originality

Since their purchase in 2013, "A" scarcely checked the volume of pallets and pads, thus the exact numbers of each, as well as their whereabouts, were unknown. The stock of each was eventually located across the production line, warehouse, transportation bays, and at the six supplier locations in January 2020. We determined that 208 of 6,505 pallets (3.20%) and 10,375 of 72,128 of pallet pads (14.38%) were worn out and in need of replacement. At the supplier locations, pallets and pads were overstocked by 20 to 30%, because they over-estimated delivery volumes. These findings resulted in the implementation of stricter rules for borrowing and collecting both good-quality and worn-out assets, as well as claims for damages.

Research Impact

In the early stages of green supply chain and reverse exchange studies in Thailand, the research herein demonstrates the environmental practice; pallet and pad exchange, adopted by one of the largest brewery plants in Thailand. The results further indicate the sustainability's progress for the future.

Practical Impact

The findings may influence "A", as well as other manufacturing plants across the country, to implement the recommended practices. Leased pallet pooling programs are now considered for effective exchange within closed-loop systems.

Keywords

Pallet and pallet pad, reverse exchange, operations improvement, brewery plant, Thailand.



REVERSE LOGISTICS IN OFFSHORE WIND: THE DECOMMISSIONING PROCESS

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Purpose

The main goal of this research was to carry out a review of likely reverse logistics operations involved in the decommissioning phase for offshore wind farms. Given there has been little experience of decommissioning offshore wind farms (only Blyth so far in the UK in 2019), this paper will set out some of the strategic issues involved and likely options that will be considered. Recommendations based on the review are made, taking into account lessons learnt from the oil and gas industry.

Research approach

The paper contains an exploratory qualitative review which covers the legislative framework, decommissioning process, likely costs and time schedules, financial securities required, recycling opportunities and lessons learnt from the oil and gas sector. It also includes a review of preliminary decommissioning plans for 8 UK offshore wind farms.

Findings and originality

The findings of this review have highlighted the fact that even though the process of decommissioning of offshore wind farms is known in theory, there is little experience of it happening in practice. Given the technological and regulatory changes that may have happened by the time decommissioning needs to be executed (up to 50 years in advance), there is much uncertainty in both the costs and time schedules in order to complete this activity. This was reflected in the preliminary decommissioning plans that were reviewed as part of this paper. There is also a particular need to consider the reuse or recycling of wind farm components at the design stage. This will increase the environmental credentials of offshore wind power as the decommissioning process already involves minimal toxic materials unlike the oil and gas sector.

Research impact

The impact of this research has highlighted how relatively little knowledge or consideration has been given to the decommissioning of offshore wind farms. It demonstrates the need for further research, particularly in the area of developing optimisation models.

Practical impact

The impact of this research has highlighted how little detailed attention has been given to the decommissioning process from offshore wind farm developers and the uncertainties inherent in the process. This research can be practically used to consider the important decisions that needs to be taken as the wind turbines approach their end of life, whether it be to repair, re-power or decommission. It could also result in more consideration of the recycling opportunities available at the design stage.

Keywords

Offshore wind farms, Decommissioning, Recycling, Optimisation.



DECARBONISATION OF FREIGHT TRANSPORT WITH SYSTEM DYNAMICS IN FOOD SUPPLY CHAINS IN UK

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Purpose

In this study, decarbonisation (reduction of carbon emissions) on food supply chain considering forward and reverse logistics operations will be analysed. The main concern in proposed system dynamics (SD) model is to measure emissions caused by forward and reverse logistics activities.

Research Approach

System dynamics modelling approach will be applied to the forward and reverse logistics activities in food supply chain to handle with complex and dynamic nature of food supply chains. Besides, environmental impact of forward and reverse logistics activities is needed to be investigated in a holistic approach.

Findings and Originality

This study is on progress and it is planned to consider UK food supply chains as a case by collecting data from industrial partners. The SD model will be designed and managed to measure efficiently distribution networks of food supply chain and compared emissions from different part of food supply chain operations.

Research Impact

The study will provide UK logistics activity and its carbon footprint using SD model, enhancing the awareness on the carbon footprint of logistic activity in food supply chain and creating more efficient and beneficial food supply chain by decreasing carbon footprint.

Practical Impact

The practical impact of the study will be, a SD model for creating solutions by considering environmental impact of carbon emissions in food supply chains. That will help supply chain actors to understand the opportunity of efficient food supply chains and enable them to manage food supply chains more effectively. Moreover, it will be provided a continuous collaboration in terms of industry-academia partnership.

Keywords

System Dynamics (SD), Transport Decarbonisation, Food Supply Chain



A CIRCULAR ECONOMY OPERATING MODEL IN INDIA FOR CLOTHING AND TEXTILES – CASE STUDY AND EVALUATION

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Purpose

The Indian NGO, Goonj, has pioneered one of the largest complete circular economy models for fashion in the world, recovering, redistributing and remanufacturing 6,000 tonnes pa of clothing and textiles, donated in India’s cities. The clothing and textiles processed by Goonj are distributed as part of social and economic development programmes in many of India’s most deprived rural communities. The purpose of this study is to build an end-to-end evaluation of the operational effectiveness of Goonj, as a case study of effective practice in rural communities and developing economies, and compare its effectiveness and cost with the alternatives of commercial textile recovery methods alongside the environmentally damaging options of landfill and incineration. The research provides an initial view on the value and potential for scaling the operating model internationally. Further research is identified as part of the paper.

Research

Approach: The Goonj recovery, remanufacturing and redistribution methods are evaluated using supply chain mapping techniques to define volumes, flows and activities, alongside cost and energy attributions for each stream of material flow using a cost-to-serve method . The analysis is based on data supplied by Goonj and extensive field visits. Comparisons with alternatives are based on metrics for the environment and direct enquiry with bulk intermediate processors and shippers of discarded textiles.

Findings and originality

The analysis of comparative data on circular economy models using supply chain mapping and costing methods is not widely published and to our knowledge, not at all for fashion. The lifecycle analysis for emissions and resource utilisation that exists does not provide insights into either the opportunity cost of the options or the critical economic factors.

Research impacts

This paper adds a fresh perspective to the global discussion on the sustainability of fashion because to date no such study has been undertaken. It provides specific insights into the “recover” phase of the circular economy leading to: “re-make, re-distribute, re-use”. The provision of hard data will create a new perspective on the definition of circular economy principles and its practical application in a low-cost economy.

Practical impact

The work provides an assessment of the economic and environmental effectiveness of Goonj’s application of the circular economy and points to the potential and issues for its further scaling, nationally and internationally in a social enterprise environment.

Keywords

Fashion industry, clothing and textiles: supply chain: circular economy: recycling: environment, sustainability



TECHNOLOGICAL VALUE CREATION IN A CIRCULAR ECONOMY

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Purpose

The circular business model literature has drawn attention onto growing influence of technology on circularity. Circular Business Models (CBM) such as, ‘Waste-to-energy’, ‘Valorisation’, and ‘Remanufacturing’ aim to mitigate negative environmental impact whilst fostering growth and prosperity. Continuous technological support, -development, and -application remains vital when supporting these CBM. Nonetheless, effective integration of technological solutions in CBMs often faces several challenges. Uncertainty around available technology and its potential benefits, financial support to integrate technology in the CBM, and collaboration opportunities are not uncommon. This research explores the role and diversity of technology in a circular setting. It identifies barriers to technological integration in the CBM as well as opportunities for value creation that arise when incorporating technological aspects into a circular business model.

Research Approach

The study applies a case study approach based on qualitative data collection. Data has been collected within one case company based in the manufacturing sector. Additional interviews were conducted with suppliers, customers and partners. The data will be analysed using the theoretical framework influenced by Social Capital Theory. In addition, the data is supported by interviews with social enterprises, political institutions, and specific tech-organisations, active in the field of circularity.

Findings and Originality

Preliminary analysis of the results show that the value created by a Circular Economy is in alignment with the triple bottom line of sustainability. The growing value of technology appears to have the potential to foster these value perspectives. Preliminary findings show, the role of technology is tremendously diverse and its application strongly depends on the idea of the circular business model as well as the stance of the organisation. Collaborative actions, digital platforms and financial support strongly influence the application and usage of technology in a circular setting.

Research Impact

Previous research has already established that technology is vital in a circular world. The focus needs to shift now towards the creation of technological value. This research will provide valuable insights in terms of the role, application and importance of technological progress in a circular economy.

Practical Impact

The study provides industry independent insights towards the role and application of technology in circular settings. It showcases the diverse integration options of technology. In doing so, valuable insights of digital platforms and collaboration opportunities are discussed.

Keywords

Technology, Circular Business Model, Case Study



APPLICATION OF DIGITAL TECHNOLOGIES IN CIRCULAR ECONOMY: IMPLICATION FOR SUSTAINABLE SUPPLY CHAIN PERFORMANCE: A CASE STUDY OF PAKISTAN BASED LOGISTICS COMPANIES.

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Motivation

It has observed through the review of the globally published academic journals that digital technologies are playing a role in circular economy transitions in developed countries through sustainable supply chain performance. In developing or underdeveloped countries, there is a significant need for CE systems along with reasonable progress in innovation and policy. This study will focus on the application of digital technologies in circular economy transition through sustainable supply chain performance: A case study of Pakistan based logistics companies for the circular economy transition.

Purpose

This research paper aims to identify and review how the developed countries' logistics companies have used the best digital technologies (Big Data and IoT) in a circular supply chain for a smooth circular economy transition. The research will base on empirically conducted data to help the underdeveloped and developing countries like Pakistan. Pakistan has selected due to an opportunity for manufacturers, traders, and logistics service providers in circular economy transition based on the world's best supply chain models, practices, and policies.

Research Approach

The quantitative and qualitative methods will help to get empirical data. The questionnaire would be drafted to fill by the managers and senior staff and interviews of the CEOs, Directors, and Owners of the companies 'of Pakistani logistics industry. The secondary data gathered from existing published and reviewed papers, industry, and governmental organizations will support the primarily collected data from logistics companies. Furthermore, the analysis based on primary and secondary data would help to achieve the aim of the research.

Findings

This research paper will show that combined or accumulative research of the circular economy, digital technologies, and sustainable supply chains are at the very initial stages due to limited research, practical implementation, and case studies. It would help to assess and forecast that digital technologies play a role in the CE transition through existing and proposed PSS business models.

Originality

The findings of the empirically conducted data will identify the missing links of the previous research for the present and future scope of the CE, DT, and SSCM fields. The newly proposed and identified techniques will help in the new policies or models of CE transition through digital technologies and sustainable supply chain management.

Research and Practical Impact

This research would identify the gaps and opportunities for researchers, professionals, and government bodies in circular economy transition through proposed new policies and models based on the previous data.

Keywords

Circular Economy, Sustainable Supply Chain Management, Digital Technologies, Big Data, Internet of Things
Paper Type
Conference Paper



COLLABORATION AS ONE OF THE PILLARS OF CIRCULAR ECONOMY - A SYSTEMATIC LITERATURE REVIEW

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Purpose

The potential of a circular economy (CE) to improve the economic and environmental performance of supply chains has captured the interest of academics and practitioners employed in various sectors (Geng et al., 2012; Masi et al., 2018; Stewart & Niero, 2018). Recent studies indicate that collaboration is one of the key pillars of the CE, which enables its benefits to spread along and beyond the supply chain (Botezat et al., 2018; Nayha, 2018). Most of the studies that focus on collaboration issues in the context of the CE are in the early stages of development, and in many, collaboration is not the focus of the study but only a side element to the discussion. This paper presents a systematic review of the literature on collaboration in CE and considers the extent to what research studies provide insights on collaboration in the CE and its contribution to enhanced sustainability of supply chains.

Design/methodology/approach: We used a systematic literature review method to identify relevant articles. Our search start considered period from 1998 to October 2019 and resulted in 89 articles. Based on the literature on Circular Economy and collaboration, we classify the literature based on extent of collaboration, (i.e. collaboration at micro, meso, and macro levels of CE), types of collaboration, (i.e. horizontal, vertical, and lateral collaboration), and collaboration activities in the CE practices that contributed to enhanced performance of CE practices (Marra et al., 2018; Masi et al., 2018; Simatupang & Sridharan, 2002; Stewart & Niero, 2018).

Findings and Originality

Our findings suggest the following. First, while collaboration at micro and meso levels of CE is covered in research studies, much less work is conducted on collaboration at the macro level. Studies on boundaries, bridges, barriers and benefits of collaboration at any level of CE can contribute to knowledge on collaboration and CE, in particular when focused on macro level of CE. Second, our study found that despite growing interest in collaboration, only vertical collaboration was investigated in more depth; a small number of studies focus or analyse horizontal and lateral collaboration. Third, our study identified collaboration activities that might improve the performances of CE practices.

Research Impact

Our study can be used as a reference for researchers and practitioners to make informed decisions on how to enhance collaboration based CE practices in their supply chains Furthermore, the study can help researchers to steer their research projects and operations towards innovation, improvement of existing supply chains or their redesign, which would enable effective and efficient transition towards use of renewable energy sources and improved circularity of material flows.

Research Limitations/Implications

Literature review considers only established CE practices, such as eco-design, resource reduction, reuse, remanufacture, and recycle.

Keywords

Circular Economy practices; Performance; Types of collaboration; Extent of collaboration.



INDUSTRIAL SYMBIOSIS PERSPECTIVES OF THE CIRCULAR ECONOMY

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Purpose

Industrial symbiosis capabilities aimed at enabling industrial transformations toward the circular economy calls for scientific advancements and innovations in three domains: business models (Lovins and Braungart, 2014), digital systems (Jabbour et al., 2018), and supply chains (Webster, 2015). These three domains represent key enablers of the circular economy, as they respectively refer to production, technological and logistics capabilities that have direct impact on the modus operandi of organisations. This paper explores circular economy business models, technologies and supply chain innovations enabling sustainable operations from the perspective of industrial symbiosis.

Research Approach

The paper develops a systematic literature review to explore theoretical and practical linkages between industrial symbiosis initiatives and circular economy business model innovations enabled by digital technologies and circular supply chains. A conceptual framework pointing out key theoretical linkages between these knowledge areas is provided.

Findings and Originality

The development of industrial capabilities to implement circular economy ecosystems requires an industrial symbiosis approach. Industrial symbiosis is a fundamental building block of the circular economy (Murray et al., 2017), as it provides a means to build industrial competitiveness and sustainability through the creation of production ecosystems involving networks of organisations that generate new economic value through resource exchanges. The implementation of restorative and regenerative production systems requires the design of more complex circular supply chains supporting circular flows of materials across diverse industrial sectors (Batista et al., 2018).

Research Impact

The paper positions industrial symbiosis as a fundamental knowledge area forming a much needed circular economy theory. The paper offers an original conceptual basis that can support the articulation of deeper (sectoral) and wider (cross-sectoral) restorative/regenerative production ecosystems for the circular economy.

Practical Impact

Industrial symbiosis initiatives involve the exchange of resources between organisations from diverse economic sectors and not necessarily from the same region. In this context, the paper points out the potential role of logistics systems as enablers of industrial symbiosis ecosystems. A deeper understanding of logistics operations in circular supply chains is an area that calls for future research.

Keywords

circular economy; industrial symbiosis; industry 4.0; circular supply chains

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THE IMPACT OF URBANISATION ON FUTURE, SUSTAINABLE LOGISTICS NETWORKS



MODELLING ENERGY USE IN AN ELECTRIC REFUSE COLLECTION VEHICLE USING A NOVEL INTERVAL METHOD

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Purpose

The popularity of electric vehicle technology is growing, and thanks to recent advances in computational power this has led to the mass adoption of electric vehicle technology for passenger cars, and model-based software solutions for both light and heavy-duty electric vehicles. Whilst plenty of research and variations of such models exist, most rely on a very precise input dataset obtained from real life recorded data in order to accurately predict the desired output parameters such as battery level estimation and instantaneous power delivery. The precision problem has an even higher priority when the vehicle to-be-simulated is expected to be used in a commercial setting, for instance on routes with a high number of start-stop sequences and a high degree of variation in vehicle weight, such as delivery vehicles or Refuse Collection Vehicles (RCV). Developing custom-spec modelling solutions for such vehicles is important as they can provide more accurate predictions for electric fleet-level operations regarding the battery state of charge on a given route.

Research Approach

This paper aims to quantitatively assess the impact of applying a simulated speed-distance dataset (derived from real-world GPS data) generated by a variation of the trapezoidal approximation mathematical method to a state-of-the-art electric RCV Matlab-based software model. The paper examines the effectiveness of the numerical method by presenting and comparing the absolute and relative error rates in predictions as well as qualitatively presents their implications at fleet vehicle level. The assessment is performed using statistical methods to benchmark the simulated datasets against the real-life recorded ones, employing statistical analysis applied on real-life emulating environments.

Findings and Originality

The novelty factor of this research is represented by the application of the numerical method itself, which is tailored for heavyweight electric vehicles that are being driven with high amounts of start-stop route characteristics that are typical of the freight and logistics sector.

Research Impact

The assessment produced by this research will open up new potential research contexts in adjacent fields to the presented application, ranging from automation of the route creation process to further improvement of the presented numerical approximation method.

Practical Impact

Similarly, if this mathematical approach is deemed to be effective it will significantly reduce the necessary time and amount of data in developing, validating and testing other similar software vehicle models, while providing significantly better predictions to public and private institutions that consider (re)designing the capability, efficiency and sustainability of their electric vehicle fleets, ranging from public transport (i.e. bus fleets) to refuse collection vehicles.

Keywords

Electric Vehicles, Software Simulation, Numerical Methods, Refuse Collection Modelling



LAST-MILE DELIVERY AND CONSUMER BEHAVIOUR IN E-COMMERCE: A SYSTEMATIC LITERATURE REVIEW

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Purpose

Last-mile delivery has been recognized as one of the most important components in e-commerce service efficiency, whilst it also includes a number of factors affecting consumer behavior. The purpose of this paper is twofold: Firstly, to synthesize elements in last-mile delivery that play an essential role in consumer behaviour. Secondly, to critically analyse models that reveal a relationship between delivery factors and consumer behaviour.

Research Approach

This paper follows a systematic literature review methodology. We review papers with key words related to 'last-mile delivery', 'e-commerce' and 'consumer behaviour' from the Scopus database. Our analysis is performed on 45 papers, selected following a rigorous, judgemental evaluation of their relevance to the topic and the quality of their theory, methodology, analysis and overall contribution.

Findings and Originality

We identify several delivery factors affecting consumer behaviour in the context of e-commerce. The factors of delivery fee and delivery time are critically important across various studies. Also, the availability of different delivery methods is of interest to customers as it increases their option space. Methodologically, most studies use surveys to study customer preferences and behaviour. There is a lack of studies that utilise other types of data, such as experimental data from lab or field experiments.

Research Impact

Our work synthesises relevant academic studies and demonstrate potential research gaps to be explored in the future. Even though, the majority of current research investigates the connection between delivery services and customer behaviour, we argue that the scope needs to be extended to include aspects of the upstream supply chain that affect delivery services, and as a result, consumer behaviour. We also argue that using field data from real-life settings can help observe actual consumer behaviour –rather than intentions–, refine hypotheses and help develop new experimental settings.

Practical Impact

The results of this study provide practitioners with a holistic view on the logistics factors affecting consumer behaviour. This can be used to better understand purchase and repurchase behaviour and lead to higher levels of customer satisfaction. Most importantly, this study indicates that, although the delivery charge is still an important factor that affects consumer behaviour, other aspects such as delivery method plays an increasingly important role. The importance of speed as a key factor also requires more careful examination as very fast deliveries are not always a customer requirement.

Keywords

last-mile delivery; consumer behaviour; e-commerce; systematic literature review



A COMMENT ON ACCESS TO DIGITAL DATA FOR FOOD SUPPLY CHAIN DECISION MAKING & COMPETITIVENESS IN AUSTRALIA

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Purpose

This paper discusses the changing nature of food supply chains in Australia and the impact this has had on the availability of high-quality data for decision making in an environment of unpredictable change. Like much of the post-World War II Western world, Australia enjoyed government support in the form of agricultural policy development to structure its food supply chains to ensure food production was seamless and protected from disruptive competition. While Australians were not incentivised onto the land via generous government subsidies, as was the case in Europe and North America, government support for agrifood production, distribution and marketing was provided in the forms of statutory transport, warehousing and marketing authorities. These created fully-integrated, low-cost commodity supply chains that not only provided Australian citizens with reliable quantities of safe, nutritious food but great surpluses were exported to our colonial masters and nearby neighbours.

We also enjoyed excellent government-funded data collection initiatives that monitored production, imports and exports. A series of policy failures, such as the government's wool reserve price scheme, eventuated in the industry-wide deregulation of most agricultural sectors. While the advent of free markets and competition has had the desired effect on stream-lining agricultural supply chains and minimising waste, the privatisation of many sectors and the rationalisation of government services has resulted in high-quality, reliable industry data being transformed from being a readily-available public good to a private good. In the absence of government support, high-quality data are now mostly generated by wealthy agribusinesses with the intellectual and financial capital to recognise their value.

Research Approach

This is a theoretical paper that explores the theories of innovation, the knowledge-based view of the firm and supply chain failure. The premise of the paper was the construction of a resilience index to measure grain supply chain resilience however this was stifled by the absence of high-quality, publically available data. We therefore reflect on this experience and question the implications for macro-level supply chain investigation.

Findings and Originality

It is concluded that, in the absence of government structures, there is an inverse relationship between the quantity of data being generated throughout the Australian agrifood supply chain and the availability of high-quality data. As such, as private agribusinesses develop in prominence, the less data are available as a public good. We question the impact of this on Australia's agrifood export competitiveness.

Research Impact

Supply chain management is a data-driven discipline with new data sets being frequently created and existing data sets expanding hourly. Understanding the availability and quality of existing data sets has substantial implications as researchers are only generally able to access publically-available sources which vary in validity and reliability.

Practical Impact

The managerial/policy implications of this research are to build a case for the provide sector to recognise the value of data which they are collecting and storing. Furthermore, it is possible that these data are not being fully-utilised so opportunity lies in viewing data as an asset from which value must be drawn by the agrifood private sector.



TRANSPORT POLICY REVIEW: WHERE DOES IRELAND STAND ON CLIMATE CHANGE FOR TRANSPORT AND LOGISTICS SECTORS?

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Purpose

In response to the increasing climate disruption and global effort to the low-carbon transition, the Irish Government has set out the national carbon emissions reduction target. The transport sector in Ireland is the second-largest contributor of carbon emission, targeting to reduce carbon emissions by 80% by 2050, relative to 1990 levels. However, the evidence has shown that the emissions from the transport sector are projected to increase by between 10% and 12% by 2020, relative to 2015 levels, which still has a long way to achieve its 2020 and 2030 targets. This research establishes an understanding of the current transport policies in Ireland towards climate change and decarbonisation, and international sustainable transport measures that could potentially be adopted in the Irish context also been identified and assessed.

Research Approach

A desk research is firstly carried out to review transport policies in Ireland and relevant policies in Europe. Policies on both passenger transport and freight transport are considered. A two-round Delphi study is carried out to canvass the opinions of transport experts in Ireland and assess the impact of international sustainable measures if adopted in the Irish transport sector.

Findings and Originality

This study provides a timely overview of the current policies on sustainable transport in Ireland, international policy measures are also identified from other European countries. Although the Irish Government shows increasing efforts towards the policy development of low-carbon transition for the transport sector, this study finds that the current policies tend to priorities passenger transport, in contract, freight transport is less reflected in terms of measures and supportive schemes towards a low-carbon transition. Through the Delphi study, the potential impact of adopting the identified international measures into the Irish context is assessed, and a list of recommended policy measures on sustainable transport is proposed. Further research is required to assess the viability of these proposed measures and the policy alignment between the government and the transport sector.

Research Impact

Prioritising policies is rarely a straightforward process, especially when time and resources are finite. Collaborations between government, industry, and research institutes are needed to support policy decisions. This study provides a basis for future policy research to further investigate the tools or methods to support policymaking in the transport sector.

Practical Impact

From a practitioner perspective, this study will help to adapt to the Irish transport sector to new climate change obligations. Future research is needed to identify the challenges and the attitudes amongst the industry to undertake the shift, thus to bring Ireland onto a low-carbon trajectory in the long term.

Keywords

Sustainable transport, passenger transport, freight transport, policy, Ireland, Delphi study



EFFECTS ON LOGISTICS OF INCREASED ON-SITE SORTING

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Purpose

The construction industry is one of the largest producers of waste and the EU waste framework directive (2008/98/EC) has established a target of 70% of construction and demolition waste (CDW) to be recycled by 2020. However, except for a few EU countries, only about 50% of CDW is recycled (European Commission, 2018). In order to increase recycling rates, sorting of waste material is of high importance (Kurdve et al., 2019). Still, there are different beliefs of where the sorting should take place; on-site or upstream the supply chain, e.g. at the waste collection company (CIRF, 2019). The purpose of this study is to increase the understanding of the effects that an increased on-site sorting may have on logistics, measured in terms of load factors and collection costs.

Research Approach

The study takes a quantitative approach, using empirical data from 22 Swedish construction projects of a construction company during the years 2016-2019. Data was gathered from the databases and bookkeeping of the construction company and the waste collection provider. This was complemented with interviews of personnel knowledgeable of the data from the two companies.

Findings and Originality

No statistic correlation could be found between on-site sorting level and load factor. Thus, an increased sorting level does not per definition add complexity in logistics. The sorting applied in the projects has in total saved about EUR 300 000 for the construction company, compared to not sort at all. This saving is in terms of lower treatment costs. However, storage and handling costs may increase for higher sorting levels, which is not calculated in this study. The saving in treatment cost also differs between material types, where greatest savings occur for combustible material compared with inert material.

Research Impact

Since 2000, CDW management has been attracting increasing attention from researchers around the world (Kambiz et al., 2016). Earlier studies in CDW management reports on pros and cons of on-site sorting (e.g. Tam et al., 2009; Wang et al., 2010). To our knowledge this is the first study that tries to empirically determine the effect of on-site sorting on load factors and collection costs.

Practical Impact

The study gives some guidelines in how construction companies could improve sorting rates and at the same time keep collection costs low. For example, our results indicate that it is positive to sort as much as possible of the chosen material from the mixed fractions and carefully choose the fractions to sort.

Keywords

Construction waste, logistics, sorting, collection costs



LOGISTICS 4.0 IN THE TRANSPORTATION PROCESS: FROM THE CONCEPTUALIZATION TO A RESEARCH AGENDA

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Purpose

This paper aims to clarify the meaning of Logistics 4.0 applied to the transportation process by providing a framework conceptualising its constituent dimensions. Regarded as a complementary approach to Industry 4.0, Logistics 4.0 is intended to provide a solution to the increasing management complexity of contemporary transportation systems. Being a field of new inquiry, the existing academic literature still lacks a common definition of the concept. Consequently, it is not clear how Logistics 4.0 can be applied to the transportation process and how organizations can seize the related emerging opportunities.

Research Approach

A systematic literature review (SLR) was conducted to derive the conceptual framework classifying the constituent dimensions of Logistics 4.0 for the transportation process. In a first round, 257 papers were identified and analysed. Then, 29 papers were selected consistently with the aim of the paper, covering the period from 2007 to 2020.

Findings and Originality

The developed conceptual framework includes three types of constituent dimensions: (1) the Logistics 4.0 principles define how to create value for the transportation process, (2) the value creation layers represent the bridging link between the design principles and the dimensions of the transportation process for the value creation, and (3) the process dimensions indicate the characteristics of the process that allow to distinguish a Logistics 4.0 transportation process from a traditional one. Research directions in the area of Logistics 4.0 for transportation process are identified and discussed. This research is original as it provides a novel framework of Logistics 4.0 for the transportation process, highlighting its constituent dimensions that should inform theory and practice.

Research Impact

This paper contributes to our knowledge on Logistics 4.0 and provides a fresh perspective on a fast developing research topic. The developed framework consolidates the extant contributions about Logistics 4.0 in transportation and extends the existing theory by clarifying the meaning of Logistics 4.0 applied to the transportation process and conceptualizing its constituent dimensions.

Practical Impact

This research has a number of practical impacts. The proposed framework provides companies with a deeper understanding of Logistics 4.0 in the transportation process. It also supports companies in creating value through Logistics 4.0 and in configuring their transportation process according to the highlighted constituent dimensions.

Keywords

Logistics 4.0, Transportation, Systematic Literature Review, Conceptual framework



THE ROLE OF DRIVER BEHAVIOUR IN GREEN ROAD FREIGHT TRANSPORTATION

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Purpose

To contribute to addressing the urgent need of both fuel consumption saving and CO₂e emissions reduction within road freight transportation sector, this research focuses on an investigation of the relation between professional driver behaviour and its impact on fuel consumption (CO₂e emissions). It also explores internal (e.g., personality, attitudes, demographic factors) (Seibokaite and Endriulaitiene 2012) and external factors (e.g., traffic volume, road conditions, work environment) caused by such differences among individual drivers (Ericsson 2000).

Research Approach

This research employs mixed research methods. Telematics data (4,000 driving records) are used to quantify physical characteristics of driver behaviour in order to present a fuel consumption model based on driver behaviour. The second part of this research (ongoing) uses survey and interview to provide deeper understanding of the mechanisms (e.g., in reaction of their personality, attitudes, external environment) of driver behaviour.

Findings and Originality

The research finds out that driver behaviour influences fuel consumption, yet, only certain characteristics have a significant influence on fuel consumption, which include harsh acceleration and cornering, and non-compliance with 20 and 30 miles per hour speed limit.

Research Impact

This research systematically reviews and examines the relation between driver behaviour and fuel consumption (CO₂e emissions) as the focal subject in green logistics and transportation area to fill the research gap firstly. Meanwhile, it probably is the first of its kind to present a fuel consumption model based on driver behaviour.

Practical Impact

The research enables logistics companies to better allocate delivery tasks to personnel with the most appropriate characteristics (e.g., who should do urban & last-mile delivery, regional destitution, or long-haul freight) and more efficiently train their drivers (especially enhance the long-term effects on driving behaviour adjustment).

Keywords

Driver behaviour, fuel economy, CO₂e emissions, road freight transportation.

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ASTUTE – SUSTAINABLE DESIGN AND MANUFACTURING



THE OPERATIONAL AND SUPPLY CHAIN IMPLICATIONS OF ERRORS IN OTIF CALCULATIONS

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Purpose

On Time In Full (OTIF) or Delivery In Full On Time (DIFOT) are measurements of logistics or delivery performance within a supply chain. Typically, it would be expressed as a percentage, measuring whether the supply chain was able to deliver: the ordered product; in the quantity requested; to a location specified by the customer; within the time period requested by the customer.

Even though OTIF is primarily a measure of logistics performance it can also be used as a measure of the effectiveness of the operations of a company. This is because in order to achieve a high OTIF performance there is an inherent need for the entire operation to work well. Ranging from procurement and suppliers to manufacturing operations to sales. This study examines the ways in which OTIF can be incorrectly calculated, the causes and the operational and reputational ramifications. Focusing on a fast-growing manufacturing company that had been experiencing stock shortages of component parts which had led to lead-times increasing.

Research Approach

Data was collected from a company's ERP system that maintains detailed records of sales orders as well as goods receipts. A quantitative approach was then taken to analyse the data based on the OTIF measure and potential interpretations of the measure.

Findings and Originality

The paper identifies a range of different factors that affect the correct calculation of supplier OTIF. These can range from the misunderstanding / incorrect use of OTIF calculation to issues with data entry within the ERP system. Furthermore, it was found that the errors can be sufficiently significant that a supplier identified as being a problem by manufacturing operations is inadvertently being protected by incorrect methods used within the procurement department.

Research Impact

Although measures such as OTIF have been used for supply chain evaluation there has been comparatively little in the way of investigation into how they can and are being mis-applied within industrial settings together with the implications of doing so. Additionally, it shows that errors in data entered and stored within ERP systems can cause problems throughout a supply chain.

Practical Impact

The work highlights some potential causes of errors that can creep into OTIF calculations including the incorrect application of the OTIF and data entry issues within an ERP system. Showing just how large the discrepancy can be between implementations of OTIF. Furthermore, it highlights that when operations indicate that there might be a problem with a supplier then it is good practice to ensure metrics are being correctly applied as errors can hide the magnitude of the problem. This is especially true when analysis produced by the purchasing department contradicts this.

Keywords

Supply Chain Resilience, Operations management, Purchasing, ERP



SUSTAINABLE PURCHASING PRACTICES IMPLEMENTATION IN FRESH FOOD SMALL AND MEDIUM ENTERPRISES IN THE UK

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Purpose

Purchasing plays an important role in achieving sustainability in the supply chain. The purpose of this paper is to investigate: How do small and medium enterprises (SMEs) in the fresh food sector in the UK implement sustainable purchasing practices? As well as how they deal with the pressures and incentives they face when carrying out this implementation.

Research Approach

This paper follows a natural resources-based view theoretical background, then employs mixed methods. These comprise of semi-structured interviews with farmers, retailers and wholesalers in five fresh food SMEs, supplemented by eleven responses to a survey questionnaire. Interview transcripts were analysed and interpreted using qualitative methods and the survey questionnaire responses were analysed using quantitative methods supported by MS Excel.

Findings and Originality

The results highlight that owners' personal commitment on sustainability provides incentives for SMEs to implement sustainable purchasing practices. Whilst brand reputation, pressures from consumers and government policies are also important drivers underpinning the implementation of sustainable purchasing practices. Although most of these fresh food SMEs consider environmental and social factors to a great extent in their purchasing decisions, the lack of financial and human resources are the main barriers that affect their sustainable purchasing decisions. However, there is also evidence to suggest that most SMEs do not require certification from their suppliers, but they have strong relationships with small and independent suppliers and often monitor them in terms of environmental and social issues. It is also found that local sourcing is a priority for most of the fresh food SMEs considering both environmental and economic dimensions of sustainability.

Research Impact

This paper provides some new insights on the frameworks typically used in sustainable purchasing practices. Furthermore, it adds the additional focus on fresh food SMEs, considering both the drivers and barriers for the effective implementation of these sustainable purchasing.

Practical Impact

This paper supports that purchasing managers should work more closely with their suppliers and local community on implementation of sustainable purchasing practices. It also suggests that fresh food SMEs require more financial and human resources in order to achieve effective sustainable purchasing practices.

Keywords

Purchasing, Sustainability, Fresh food, SMEs, Supply Chain.



INTERPRETIVE VIEW OF INDIAN MANUFACTURING SME EMPLOYERS FOR NOT ADOPTING GREEN SUPPLY CHAIN MANAGEMENT PRACTICES IN THEIR FIRMS

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Purpose

The purpose of this study is to explore the barriers faced by the Indian manufacturing small and medium enterprises (SMEs) to adopt green supply chain management (GSCM) practices in their firms. This study aims to capture the interpretative account of the SME employers on adopting GSCM practices, which to date has not been addressed in the domain of GSCM in Indian context.

Research Approach

This study is exploratory in nature and aims to investigate the barriers faced by Indian manufacturing SME employers to adopt GSCM practices. Qualitative research method is used to gather rich and rigorous information from experienced employers from different geographical locations in India. Semi-Structured interviews are collected based on pre-established interview question and the data will be analysed using thematic analysis method.

Findings and Originality

The study indicate that there is a low level of GSCM adoption in the Indian Manufacturing SME organisations. In addition, SME employers are found reluctant to move away from their traditional business processes. Lack of government support and lack of knowledge among SME employers are among many reasons that prevents them from adopting these practices. The interview method allowed the researcher to capture much relevant factual information about non-adoption of GSCM practices among Indian manufacturing SMEs.

Research Impact

The findings of this study may benefit the academicians and practitioners to understand the involvement of SME organisations in adopting GSCM practices. This can further assist them to plan and make necessary policies to minimise the negative environmental impacts caused by such organisations due to little or no knowledge about GSCM and its practices.

Practical Impact

The findings of this study will assist managers of different organisations to take necessary actions to overcome the challenges by developing appropriate green strategies and to completely adopt GSCM practices in their firms.

Keywords

Green supply chain management practices, Barriers and Indian SME employers



THE ROLE OF LOW-POWER WIDE-AREA NETWORKS IN REVERSE SUPPLY CHAIN MANAGEMENT FOR SUSTAINABILITY

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Purpose

Low-power wide-area networks (LPWAN) are becoming increasingly popular in the Internet of Things (IoT) domain because of their long-life cycle, reduced cost, and ability to interconnect scattered devices over kilometer-long distances. The aim of this work is to explore the possibilities and applications of LPWAN in reverse supply chain management and their implications in the Triple Bottom Line dimensions of sustainability, namely social, economic and environmental. Furthermore, a specific-case approach focusing on the LoRaWAN LPWAN standard as a means of identifying open research issues towards technology adoption in the Reverse Logistics (RL) research field is addressed.

Research Approach

This paper follows an exploratory research methodology. Through an extensive literature review and case study research, upcoming trends in reverse supply chain management and RL domains are examined. Data is gathered qualitatively and, in turn, analysed as a means of identifying existing technological issues of the LoRaWAN standard that might become a barrier to LPWAN adoption in RL.

Findings and Originality

With RL being one of the pillars towards sustainable development of manufacturing, this research reviews and assesses recent trends and applications considering social, economic and environmental criteria, focusing on the specific case of end-of-life electric vehicle batteries' recovery. On the basis that RL benefits from the integration of IoT (and more specifically, LPWAN), the focus is put on the LoRaWAN standard, highlighting its main strengths and limitations to this end. The standard complies with TBL principles through low deployment costs, reduced energy demand, and infrastructure-sharing capabilities. However, several challenges oriented to RL are defined in order to discern future research directions in the field.

Research Impact

Based on a review of the latest trends and applications of RL, upcoming research challenges are pointed out to enhance communications' performance using the LoRaWAN standard. With the focus put on network scalability, other challenges addressed include reliability, consumption, and coverage.

Practical Impact

Despite LPWAN being a promising technology to accelerate RL breakthrough, most standards are at a very early stage of development and need to improve certain aspects. By exploring the LoRaWAN standard, this paper presents a roadmap for the development and integration of LPWAN technologies into organizations, and more specifically, in reverse supply chain management for sustainability.

Keywords

Internet of Things, Low-Power Wide-Area Networks, Reverse Supply Chain Management, Sustainability.



ADDITIVE MANUFACTURING AND LOCALISATION

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Purpose

The sustainability of global manufacturing supply chains (SCs) is being called to question, with rising labour costs in developing economies, increasing trade tensions between nations and the Covid-19 Pandemic (Foroohar, 2020). Localisation is the trending theme in manufacturing circles, driving conversations on re-shoring and distributed manufacturing, however little is known about the viability of these SC strategies. With a relatively low minimum efficient scale, Additive Manufacturing (AM) has been identified as a route to localised manufacturing, however numerous challenges remain (Braziotis et al., 2019). In this paper, we assess the relative possibilities for localised manufacturing provided by metal and polymer AM and highlight implications for SC configuration.

Research Approach

SC configuration theory is adopted to explore metal and polymer AM SCs with respect to production of end-use parts (Srai and Gregory, 2008). An embedded case study approach is adopted to build cases for metal and polymer AM SCs, with the SCs of focal firms serving as embedded units. Semi-structured interviews are conducted with key informants in supplier tiers and complemented with site observations. Within and cross case analyses are conducted to identify distinctive characteristics.

Findings and Originality

We find that metal AM has a more limited scope to go local than its polymer AM counterpart. We highlight the necessary barriers in metal AM that need to be addressed by industry to increase the scope for localisation for purposes of reshoring or distributed manufacturing.

Research Impact

This research extended SC configuration theory by highlighting the nuanced nature of upstream configuration decisions for SC applications based on different materials. It also contributes to AM implementation in highlighting factors to be considered in configuring metal and polymer AM SCs.

Practical Impact

In an era where localisation and reshoring is gaining traction, this research provides a framework for organisations to re-evaluate their SC-reconfiguration strategies with AM, for their assembly and maintenance operations. It also provides a roadmap for implementation in identifying salient factors to be considered in configuring metal and polymer AM SCs.

Keywords

Additive Manufacturing, Distributed Manufacturing, Localisation, Re-shoring, Supply Chain Strategy

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USING SUSTAINABLE MANUFACTURING INCLUDING LEAN PRINCIPLES FOR CREATING A DISCRETE EVENT SIMULATION MODEL FOR PATIENT FLOW THROUGH THE A&E DEPARTMENT IN UHW

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Purpose

There is an urgent need to achieve the government target of not exceeding the average four hours patient waiting times in the Accident and Emergency (A&E) department at the University Hospital of Wales (UHW). Despite all the efforts put in by the hospital staff to meet this target the waiting times vary in reality where the average waiting times often exceeding the target during the peak demand.

Research Approach

The key to solving this problem lies in the data that is available for analysis which would show the patient demand in detail per day, week, month and year. The innovative idea for handling the varying patient demand lies in the expertise gained in the area of Sustainable Manufacturing where processes are planned in advance according to Lean principles for utilising the available resources to maximise the throughput while at the same time eliminating the waste while maintaining some slack in the system.

Findings and Originality

This paper focuses on identifying the similarities and differences between a Sustainable Manufacturing System and a Healthcare System and provides a framework for studying the behaviour of patient flow through the A&E department at UHW by making it look similar to that of parts entering and moving through the different manufacturing processes where value is added to the part at each stage before it turns out to be the finished product ready to be tested for quality and distribution.

Research Impact

The baseline data gathered through process mapping is used to develop a Discrete Event Simulation (DES) model to mimic the patient flow. This model can be used to study the capacity of the system by simulating the flow under different scenarios to identify the hotspots and blockages that can clog up the process. This can lead to some remedial actions which can be implemented to alleviate the problem and offer near optimal solutions.

Practical Impact

The advantage of this model is that the so called hotspots or bottle necks which would cause the target waiting time to escalate can be identified by simulating different patient demand scenarios under a given workflow and based on the statistical analysis of simulated results changes could be made to the model in order to alleviate the factors contributing to the cause of the delays whereby the waiting times could be reduced to the expected target. The model parameters which improved flow times can then be implemented in the A&E department to achieve the expected average waiting times targets in reality.

Keywords

Sustainable Manufacturing, Lean Manufacturing, Discrete Event Simulation, Patient Flow, Accident & Emergency Department



USING ADDITIVE LAYER MANUFACTURING FOR MAKING CONCRETE FAÇADE MOULDS

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Purpose

There is a need to look into the current manual process of making concrete façade moulds in order to shorten the overall time to manufacture and make it less dependent on manual skill. Therefore, this study focuses on the feasibility of introducing sustainable design and manufacturing process through a combination of 3D scanning and Additive Manufacturing (AM) and develops an economically viable manufacturing process chain for the manufacturing of elements of the cast stone moulds.

Research Approach

3D scanning offers the capability to capture and digitalise shapes, while the main advantage of AM is its capability to rapidly build highly complex geometries at reduced costs.

The proposed method used digitalisation of mould making process by reverse engineering the artefact to create the CAD model for utilisation by the AM machine for 3D printing the mould. While using the CAD model, support structures as well as design variations were introduced for improving the design of the mould for better load bearing at vulnerable points of the mould in order to increase its durability. In addition, some experiments were conducted, such as changing wall thickness combined with supports, to see how the material used to build the mould could be reduced to achieve greater sustainability.

This work was done in collaboration with Procter Cast Stone, an SME based in Caerphilly, South Wales, that reproduces, designs and manufactures prefabricated cast stones (copings, balustrading, architectural components, etc.) for the house construction industry.

Findings and Originality

Currently, the production of the wooden moulds by expert mould makers is done manually and is very time consuming, particularly in the case of complex geometries. The proposed approach is to scan the artefact using a 3D laser scanner to generate the CAD file for the mould design which is 3D printed by an AM machine. The initial results show that it is possible to recreate the current casting production used to make the concrete facades by using 3D printed moulds.

Research Impact

Using an SLS process it is possible to create moulds from Nylon 12 that are able to withstand the necessary pressures without excessive deformation and stress build ups for a mould of both simple and complex geometries.

Practical Impact

It was found that it is more time and cost effective to print small scale moulds of complex geometry where there would be large machining costs, whereas a simple mould could most easily be made from conventional production methods. In short, the proposed digitalised approach could reduce the time to manufacture the moulds, eliminate waste and save money.

Keywords

Additive Manufacturing, 3D Printing, Selective Laser Sintering, Sustainable Design, Sustainable Manufacturing



CREATING A MULTI-DISCIPLINARY ADDITIVE MANUFACTURING RESEARCH NETWORK: A PROPOSAL AND AGENDA FOR ENGAGEMENT

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Purpose

Research on additive manufacturing (AM) within supply chain and logistics management is in nascent stage but has grown significantly over the last 5 years. Companies across manufacturing sectors have adopted AM for prototype manufacturing, tooling, spare parts production and to a limited extent for serial parts production. There is an increasing interest for producing customised artefacts in consumer businesses and also for food production. Many types of AM networks have emerged over the last 5 years-some led by industry, some by educational institutions and others by non-profit or governmental organisations with the objectives to increase the rate of adoption of AM within the industry. These networks share knowledge amongst members and primarily try to address technical or regulatory challenges associated with adoption of AM. There is no multi-disciplinary network for AM research spanning engineering, supply chain and logistics management disciplines. The objective of this research is to propose the creation of such a network to encourage researchers across disciplines to conduct research on implications of AM.

Research Approach

Building on previous research on AM networks and services (Søberg et al., 2019; Chaudhuri et al., 2019), literature review of AM related papers published in Engineering, Operations Management, Supply Chain and Logistics Management disciplines, secondary sources e.g. websites of AM networks and participation in such networks by members of the author team, this paper tries to identify some areas of focus for an AM research network for supply chain and logistics management disciplines.

Findings and Originality

Our findings show that there is limited research on AM in supply chain management and logistics disciplines compared to AM research focussed on engineering published in Engineering Design, Materials Science and Prototyping related journals. As AM adoption across the supply chain is a multi-disciplinary effort involving experts from both engineering, supply chain and logistics management disciplines, we believe there is a need of an academic network to promote such multi-disciplinary research on AM.

Research Impact

The proposed network will promote multi-disciplinary research on AM and bring together academics to spearhead research on AM. It will also groom future scholars who will conduct research on AM. The network plans to conduct research across multiple themes such as Role of networks in AM adoption, Business models for AM and digital manufacturing platforms, Design for AM and its impact on product development performance, Supply Chain Performance impact of AM, Parts selection for AM and Planning and scheduling of AM production to name a few.

Practical Impact

The proposed network will engage in high-quality research by working closely with industry partners across sectors, will disseminate research across various forums and will seek to obtain funding to sustain the efforts.

Keywords

Additive Manufacturing, multi-disciplinary; academic network, engineering, supply chain and logistics

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REAL-TIME IMPROVEMENT OF THE LOGISTICS SYSTEM THROUGH DYNAMIC BOTTLENECK CONTROL IN A MULTI-VARIANT PRODUCTION SYSTEM

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Purpose

Although there is a plethora of literature on bottleneck analysis and the movement of dynamic bottlenecks has been extensively defined and visualized, intralogistics systems have been neglected in most research. Bottleneck research is often based on two assumptions, namely that the first process never starves and that inexhaustible raw material resources are available. Since this is not the case in real production environments, it is necessary to consider intralogistics processes and the corresponding variables as part of the whole and not as a static and separate system offering an infinite supply. This work is intended to develop a not only scientifically founded, but also practically applicable method for identifying and preventing dynamic bottlenecks of intralogistics systems supplying an assembly line in a multi-variant environment.

Research Approach

The methodology was empirical and quantitative. The research project was developed based on an existing production system, a multi-variant assembly line in the automotive sector. Given the high complexity of the process, a simulation-based solution was selected. Logistics processes can be interpreted as discrete-state and event-driven systems. The application of discrete-event-simulating incorporated with real-time data was therefore chosen to build a digital twin of the logistics system.

Findings and Originality

The developed model can variably simulate any production relations with the help of discrete event simulation paired with real-time data and correctly identify and visualize the shifting bottlenecks. Considering the changing parameters, the tool thus enables the proactive identification of blockages and the development of proposals for optimised reorganisation. This work complements existing research as it is now possible to analyse the entire value chain regarding process limiting factors.

Research Impact

The idea of systems adaptivity has been widely studied over the past decades. Self-adaptive systems intend to recognize changes in their own behavior, simulating the effects and making suggestions for optimization. A first step towards a self-adapting logistics system is the transition from a one-off, static planning and operating cycle to a continuous re-planning and reconfiguration of systems.

Practical Impact

The continuous shortening product life cycles and exploding numbers of variants lead to the requirements of more frequent monitoring for adaptation. The digital twin will be used as a planning support system for identifying early indicators of change requirements and shorten the planning periods.

Keywords

Dynamic Bottleneck Detection, Predictive Intralogistics System, Discrete-Event-Simulation, Digital Twin



APPLICATIONS FOR SMART WATER MONITORS

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Purpose

A high proportion of claims paid by insurance companies are due to water damage of domestic and industrial properties. The annual cost of such damage can be up to 730 million pounds. Such adverse events can be particularly costly in NHS facilities, where not only the water damage has to be dealt with but also there can be knock on effects such as the closure of wards and operating theatres and loss of expensive equipment. In addition, many items that commonly have to be written off as a result of domestic floods (such as flooring and furniture) are difficult to recycle and add to levels of waste in the environment. In recent years several different “SMART” devices to detect and prevent water damage have entered the market but few have been extensively tested, especially in large facilities.

The aim of this paper is to discuss the potential of SMART devices to reduce water related damage in both domestic and industrial facilities. In addition, the results of investigations into whether machine learning analytical techniques can be used to monitor water usage patterns and predict leaks are presented.

Research Approach

Literature reviews were carried out using academic journal papers, conference proceedings, the trade and popular press and commercial websites. Simulated data was obtained from EPANET. Water usage data was collected using a prototype SMART device developed by Pro-Flow Ltd. and ASTUTE 2020.

By monitoring the water usage patterns for shower, bath, toilet, kitchen, washing machine, dishwasher, etc. for households with varying number of occupants over 24 hours per day taking into account typical working days and weekends historic data was collected either from Pro-Flow sensor or simulated using EPANET as a time series signal, using a suitable sampling rate. After labelling the observed patterns, this data was used to train classifiers to recognise these patterns. Later, these classifiers were used to identify any unusual water usage patterns, which deviate from the learnt patterns, to be the result of suspected water leakage.

Findings and Originality

This paper identifies a number of applications for the use of SMART devices to monitor and control water usage in domestic and industrial settings. It presents initial results from the use of machine learning techniques to attempt to detect changes in water usage patterns using both simulated and data collected from a domestic setting. The results show that the machine learning algorithms are capable of learning the water usage patterns in a customised manner and predict suspected water leakage, caused by taps that were left open or due to burst pipes, more intelligently than the conventional method of triggering warning signals when the water usage exceeds a pre-set threshold value which is prone to raising more false alarms.

Research Impact

The impact of this research will enhance the features of smart devices, smart homes and smart buildings by incorporating real-time data as a main driver for giving early warning and intelligent decision making capability in a customised manner. In addition, water usage can be managed in a more sustainable way. Further, remote monitoring of smart homes and smart buildings using big data collected from different geographical locations can provide more insight into the water usage patterns through applying deep learning techniques.

Practical Impact

Protecting properties and contents from damage caused by water leakage can lead to economic and environmental sustainability. This study opens up the issues related to personal data security and data storage which will have practical implications on insurance policies.

Keywords

Smart Water Monitor, Smart Homes, Smart Buildings, AI and Machine Learning, Pattern Recognition, Pro-Flow, Environmental Sustainability



CRISIS AND DISRUPTION MANAGEMENT



A CLOSER LOOK AT THE DEFINITION OF RESILIENCE AND ITS CAPABILITIES: A TOOL TO SURVIVE AT A TIME OF CRISIS

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Purpose

Market shocks such as COVID-19 has drawn the attention to importance of adaptability. More specifically, resilience, which allows organisations to survive these market shocks. This research aims to propose major resilience capabilities that can be used to enhance organisations' adaptability and recovery during and after crises.

Research Approach

This study synthesis key resilience capabilities from existing literature in different disciplines such as psychology and economics in order to propose main resilience capabilities.

Findings and Originality

Drawing on different disciplines' and dynamic capabilities theory this research evaluates definitions of resilience and its capabilities to propose major antecedent capabilities for resilience that can be used to survive at a time of crisis. Based on the analysis of resilience and its capabilities definitions, in addition to dynamic capabilities theory, five major capabilities; namely, redundancy, flexibility, agility, collaboration, robustness are selected as antecedent for resilience which can be implemented to enhance adaptability and recovery.

Research Impact

Even though there are abundance of research on resilience, there was no focus on explaining the links between different resilience capabilities and clearly explaining their definitions and links among them. This research evaluates resilience capabilities through combining dynamic capabilities theory and various resilience capabilities proposed by previous research by critically analysing their definitions. In addition, it illustrates the differences and potential links between these capabilities in order to provide insights on the major resilience antecedent.

Practical Impact

Resilience can be a tool for organisations to overcome current global crisis of COVID-19 spread and future similar crisis. Combining resilience capabilities from various disciplines and critically analysing them can help for a better understanding of the concept and for easier application to enhance adaptability.

Keywords

Resilience, resilience capabilities, dynamic capabilities, risk management, dynamic capabilities theory



THE CHALLENGES AND OPPORTUNITIES FOR MANAGING SERVICE SUPPLY CHAIN IN RESTAURANTS DURING COVID-19 PANDEMIC

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Purpose

The purpose of this research is to discuss the challenges and the opportunities based on the customer behaviour changes for managing efficient service supply chain in restaurants during the Covid-19 pandemic.

Research Approach

This paper attempts to investigate challenges and opportunities for managing service supply chain in restaurants business during the crisis of Covid-19 pandemic. While many counties have struggled with the food supply chain disruption, but Thailand is still available to deliver service to customers. In this context, Thailand is selected as the successful example of countries having the proactive strategies on service industry in particular restaurants or eateries. The context of Covid-19 pandemic and service supply chain management are undertaken from a limited literature review. The research primary data were collected from volunteers including customers, deliveryman, and restaurant staffs through the questionnaires and semi-structured interview. Then, the results will be statistically analysed by using descriptive statistics. These results will be the building blocks for proposing the opportunities to restaurants to be more proactive to respond customer demand during the Covid-19 pandemic.

Findings and Originality

Due to the Covid-19 pandemic, the customer behaviour will potentially change which would affect the whole service supply chain. Even though there has been the negative impacts on global and domestic demand, some business especially restaurants need to strive for their incomes. This research tries to highlight the challenges and investigate the opportunities to the restaurant business to be survivable. The results will originally show the trends and customer preferences changing in Thailand due to the Covid-19 pandemic. Additionally, the findings will shed light on the opportunities that restaurants would keep it in mind to adapt themselves with the current crisis of Covid-19 pandemic. In this regards, this research also provide the opportunities based on the service supply chain management perspective in Thailand as the successful example to respond the customer demand.

Research Impact

No research has undertaken to study about the proactive plan for managing service supply chain management in restaurant business during the Covid-19 pandemic. There is a limited of literature review about the effects of Covid-19 to understand the situation on the service supply chain in service industry. Thus, the researchers will identify the challenges and propose the opportunities for managing service supply chain and also fulfil the gap of knowledge for a literature review in terms of applying service supply chain during the Covid-19 pandemic.

Practical Impact

This research will create awareness among the academics and practitioners the importance of service supply chain management in service industry especially restaurants. The results from this research would encourage the restaurant owners, staffs and deliveryman to understand the customer trends and patterns and also adapt their business to match with the customer demand during the Covid-19 pandemic.

Keywords

Service supply chain, service supply chain management, food supply chain, COVID-19, supply chain, coronavirus



THE IMPACT OF COVID-19 ON CONTAINER PORTS

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Purpose

Since December 2019, Corona Virus Disease 2019 (COVID-19) has had a serious impact worldwide. The impact of COVID-19 was also strongly felt in the transportation industry. Ports and shipping lines in severely affected areas have experienced interference to varying degrees. This paper aims to explore the impact of COVID-19 on maritime transportation with a particular focus on ports and container line networks, and to investigate both changes during the outbreak period and recovery after the outbreak.

Research Approach

Based on a time series analysis of Automatic Identification System (AIS) data from 25 ports around the world, this paper investigates changes in port throughput and vessels waiting time during COVID-19. In particular we assess ports and container networks levels of vulnerability to disruption.

Findings and Originality

At the time of writing the impact of COVID-19 to date (April, 2020) on ports has varied. Traffic volume declined in some ports in the first quarter but has actually risen in others. The pattern of port volume decline basically followed the geographical spread of the virus. For example, COVID-19 first hit China in January, Shanghai showed an obvious decline in February and returned to normal gradually in late March. Compared with the average turnaround time in 2019, most of the ports in our sample showed extended average turnaround time due to the pandemic.

Research Impact

As the pandemic is still ongoing, there are not many research results on COVID-19 and its impact on ports and container shipping networks. Research on the vulnerability of the shipping network usually considers disruptions such as weather, strikes, terrorism and so forth, hence this research focusing on a biothreat is relatively novel.

Practical Impact

The impact and damage caused by COVID-19 on the maritime network has been unavoidable. In addition to the reduction on container transportation demand and the interruption of supply chains caused by shutdowns during the pandemic in the short term, COVID-19 will also have an impact on world economic development and export trade in the long term. However, the impact on different nodes in the network differs. Furthermore, our research intends to also investigate how the network will recover from the disruption caused by COVID-19 and any changes that will ensue.

Keywords

Container networks; Ports; COVID-19.



MANAGING RISKS IN THE UK HALAL MEAT SUPPLY CHAINS: A MULTIPLE CASE STUDY

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Purpose

The purpose of this paper is to explore how the institutional isomorphism has shaped supply chain risk management processes (SCRMP) of Halal meat companies operating in the UK Halal meat industry. Growing Muslim population and internationalisation of the Halal meat industry has led to increased demand for Halal meat across the globe (Zulfakar, et al., 2018). However, most of the Halal meat is processed in the non-Muslim countries, leading to the issues of Halal transparency and fraud (Talib et al., 2015). Thus, it is important to manage Halal supply chain risks to ensure Halal integrity and supply chain continuity.

Design/Methodology/Approach

An exploratory qualitative multiple case study approach (Yin, 2018) is adopted for this research. The case companies were selected based on their major operations and target respondents were selected based on the purposive sampling. In total, 34 semi-structured interviews were conducted with the senior management in four case companies. For the research data and the overall research quality, reliability and validity, interview data further triangulated by observations and documentary analysis. Thematic narrative analysis and social constructionism applied to analyse the collected data and report major findings.

Findings

Despite the growth prospects, the UK Halal meat industry lacks collaboration and integration. Lack of resources and increased disruptions has increased dependency of Halal meat retailers on their supply chain partners. Case companies identify their supply chain risks by looking at costs, collaboration, and legislation and business reputations. Case companies prioritise their supply chain risks based on costs, business reputation, and trust based relationships and in collaboration with Halal certification body. For the risk mitigation, case companies use multiple sourcing, cooptition, legal compliance, cost management and use of track and trace technologies. We also found that cost, margins and business reputation were main considerations at all three phases of the SCRMP within the case companies. Finally, all three institutional pressures (coercive, mimetic and normative) found in play and shaping SCRMP of case companies, however, coercive pressures (costs and laws) were main driving forces for the SCRM.

Originality/Value

Based on institutional theory, key risks, their identification, prioritisation and mitigation strategies explored in the context of UK Halal meat industry. The explored strategies can be used by other companies to benchmark the best practices.

Research Limitations

Due to exploratory and qualitative nature, the findings of this research are only applicable to research case companies and, therefore, cannot be generalised.

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RETHINKING SUPPLY CHAINS AFTER COVID19: WHAT NEW PACKAGING REQUIREMENTS?

Purpose

Recent academic and professional studies have started to examine priorities within the tension area standardization customization regarding packaging solutions within supply chains, both from a supply and a demand perspective (Bemis Company, 2016; BillerudKorsnäs, 2018; Highland, 2018; Fulconis and Philipp, 2019; Smith-Forbes Insights, 2018). The world has changed since; the current corona pandemic strongly affects the configuration and nature of supply chains: international versus domestic ones, supplier dependence versus (country) sovereignty etc. Packaging as a key element of logistics processes with both operational and strategic impacts on supply chains is at the very heart of this trend. Traditionally, the packaging choice between standardization and customization had been influenced by globalization, circular economy and omnichannel requirements (Philipp and Fulconis, 2020). However, since covid19 cards will have to be re-shuffled, as novel requirements for both supply chain members and targets (i.e. shoppers) superimpose with more traditional considerations, increasing once more complexity that packaging players were already familiar with. Novel pandemic-induced packaging requirements stem from changed customer expectations and behaviours regarding hygiene and safety (substrates that minimize the possibility of the virus's survival on the packaging surface...) as well as from substantial changes of our supply and/or packaging chains (endogenous level) and their operating contexts (exogenous level). Vis-à-vis this area of tension, supply chains have to be reassessed, and a new equilibrium for packaging solutions seems inevitable. E-commerce and related e-supply chains have known a significant sales increase during the crisis for numerous product categories (Deloitte, 2020), justifying a comparative approach with traditional channels. Our paper contributes to orient supply chain actors regarding their packaging choice in this new era of business.

Research Approach

In this paper, we mobilize traditional theories (standardization versus customization, speculation versus postponement) and other well-established concepts in packaging logistics in order to categorize and locate recent evolutions, e.g. interpreting "hygiene" as a specific logistics protection function and plastics packaging material – with negative ecological but positive safety advantages – as constitutive part of packaging solutions and design. The presentation of a field study (using an online questionnaire) we conducted amongst shoppers during the current crisis supports our reflection.

Findings and Originality

Our findings build a bridge between novel customer expectations and supply (chain) constraints and opportunities, towards the ideal packaging solution.

Research Impact

Our paper proves the adaptation and contextualization potential of extant concepts in packaging logistics for the new age of supply chain management, proposing theory-based guidance identifying the best packaging choice within the zone of tension opposing safety, product protection, marketing and the environment.

Practical Impact

Our findings contribute to propose the "ideal" packaging design or solution to supply chain actors facing the antagonism between the four main packaging protection functions. As the corona outbreak and its global business impacts are often referred to in the same breath as major historical milestones such as the Great Depression, it is vital to assist the various packaging players striving for a "new balance" vis-à-vis the mixture superimposing short term and medium/ long term trends.

Limits of the study

Limits of our empirical study include features related to the sample size and the downstream focus.

Keywords

covid19, packaging logistics, supply chains, logistics functions of packaging, shoppers



ADDRESSING PPE SHORTAGE THROUGH THE LENS OF CHARITABLE PALLIATIVE CARE PROVIDER. A CASE STUDY EVALUATION OF HOSPICES IN THE UK IN THEIR OPERATIONAL RESPONSE TO THE COVID-19 PANDEMIC

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Abstract:

Purpose

The purpose of this research is to address how organisations who provide end of life and palliative care responded operationally and managed their PPE supply chain during the early stages of the global pandemic supporting their local hospital trusts and their community.

Research Approach

This research comprises of a literature review and a case study of 3 charitable organisations in the United Kingdom. These organisations provide specialist complex palliative care. Qualitative methodology is used to collect and analyse the data collected and therefore interpretive.

Findings and Originality

There is little literature that addresses the topic of supply chain through the lens of palliative care this paper addresses a gap in the literature regarding supply chain and palliative care.

As infection control guidance changed rapidly procurement teams had to be agile to ensure stable supply to ensure continuity of service. Hospices deliver care to a clinically diverse patient population; patients have complex needs both at the end of life and children with life limiting illness. They operate lymphedema clinics in the community and hospice services in the home. These diverse services provided operational challenges regarding the provision of PPE and clinical waste. The case study organisations did not initially have access to the NHS supply chain despite the key part being played to support mainstream NHS services. Palliative care suffered those pinch points of supply as the hospitals however were not initially supported by the NHS supply chain .

Research Impact

This sector is under researched as it operates outside of the NHS as charitable organisation. This paper investigates the supply chain of palliative care and the operational challenges presented in the covid -19 outbreak in 2020.

Research limitations: This research is limited by means of time to include more organisations and gives findings of the initial response.

Practical Impact

The case studies provides examples of organisations adapting to a new operating model at pace. This learning can be used in future to adapt to supply shortages.

Four Key words

PPE, Supply Chain management, Infection control, global sourcing



THE EFFECTIVENESS OF FOOD RE-PROVISIONING DURING COVID-19: A RESPONSE TO THE UK PARLIAMENTARY FOOD AND RURAL AFFAIRS COMMITTEE CONSULTATION

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Purpose

This paper represents part of the evidence to questions set by Parliament's Environment, Food and Rural Affairs Committee, which exists to scrutinise the UK Government's Department of Environment, Food and Rural Affairs in relation to the coronavirus pandemic. Specifically, "Have the measures announced by the Government to mitigate the disruptions to the UK food supply chains caused by pandemic been proportionate, effective and timely?" and "What further impacts could the current pandemic have on the food supply chain, or individual elements of it, in the short to medium-term and what steps do industry, consumers and the Government need to take to mitigate them?".

Research Approach

The context herein reviews food logistics interventions measures, the overall food system mass and efficient re-provisioning individual elements of the food supply chain. Extant empirical literature was used and thematically categorised into a priori codes, so that transformative insight could be disseminated e.g. to the Department for Transport and the Highways Agency. Eight industry-focused interviews occurred to identify opportunities for and barriers to efficient food re-provisioning in a national emergency.

Findings and Originality

Broader challenges in food logistics and distribution in the run-up to Covid-19 were largely linked to diseconomies of scale and skilled driver shortages, exacerbated by a relatively high proportion of non-UK citizens (12%) employed as drivers, and the vast majority of >48,000 UK operators classed as MSMEs. However, the temporary extension of driver hours, relaxation of vehicle related inspections, and driver related relaxation of CPC had a positive impact in keeping food logistics moving. Whilst the overall balance of food production and food imports remained largely stable, the UK was still subject to the bullwhip effect of febrile panic buying that exposed food supply chains reliance on lean networks and limited ability to be agile during a crisis. Distribution centres became bottle necks both at the first mile of delivery and the last mile of reverse flows.

Research Impact

This research adds to extant knowledge around food re-provisioning by revealing that supply chains with higher degrees of vertical integration carry more risk and are therefore more likely to buffer against service failure by creating more opportunities for waste to occur. Typically, risks present in supply chains with higher degrees of integration become asymmetric risks leading to excessive buffering, inventory and movement. Notwithstanding these factors, and in the context of the submitted report, these should be alternatively viewed as nodes in a food supply chain where re-provisioning opportunities may arise, thus moving away from unbalanced relationships, towards more exemplary proactive logistics practices and an equilibrium approach.

Practical Impact

Recommendations include establishing specific inter-ministerial lines of communication to enable more impactful cross-boundary interventions which reduce unnecessary duplication of effort. A concerted effort of government agencies and industry stakeholders are required to expedite the improvement of basic support logistics network fundamentals for food freight, storage, and distribution worker facilities. The Government's initial £16m payment for frontline food charities during COVID-19 was flawed and damaged existing community food initiatives, resulting in a restricted partner pool becoming the only UK organisations through whom surplus food should be redistributed on behalf of the entire third sector.

Keywords

Food supply chains; food re-provisioning; UK Covid-19 response; food logistics; food waste.



SOCIAL AND RELATIONAL ASPECTS OF SUPPLY CHAIN



MODERN SLAVERY AND LABOUR EXPLOITATION RISKS IN ROAD FREIGHT TRANSPORT AND WAREHOUSING: AN EAST MIDLANDS CASE STUDY OF RISKS AND PREVENTION

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Purpose

The aim of this research is to progress understanding of labour abuse risks associated in the road freight transport and warehousing sectors in the UK, focusing on the East Midlands as a key location for transport and logistics. The research aims to provide a coherent evidence base for understanding the factors that give rise to exploitative labour and employment practices, and measures that can be put in place to improve working conditions and protect vulnerable workers. The research is funded by the Chartered Institute of Logistics and Transport (UK).

Research Approach

This project adopts a qualitative case study and problem centric approach to addressing labour exploitation risks and prevention in the road freight transport and warehousing sectors. The research involves a review of current evidence of the working conditions in the sector in combination with wide-ranging and detailed semi-structured interviews with drivers of heavy good vehicles, warehouse operators and relevant stakeholders to fill in knowledge gaps and identify best practices for reducing and responding to the risk of labour exploitation.

Findings and Originality

The current research is work in progress. It will yield new and synthesised evidence on the business models, terms of employment, work conditions and key trends that contribute to exploitative labour and employment practices and interventions to protect the rights of workers.

Research Impact

The research will benefit other researchers and practitioners working in the field of modern slavery and transport and logistics by generating knowledge of labour exploitation in the road freight transport and warehousing sectors and approaches to researching and addressing related issues in other at risk sectors.

Practical Impact

The research will provide industry practitioners with a richer and in depth understanding of labour exploitation risks and prevention in the road freight transport and warehousing sectors. We will publish a guidance on best practice which makes recommendations of measures that can be put in place to safeguard workers. The guidance will be disseminated through the Chartered Institute of Logistics and Transport (UK) Knowledge Centre.

Keywords

Road freight transport, warehousing, labour exploitation



HOW DO WOMEN IN LOGISTICS PERCEIVE SELECTED MANAGERIAL CAREER-RELATED OPPORTUNITIES AND ISSUES?

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Purpose

Women are easily overlooked as a significant part of the logistics industry. The purpose of this study is to explore potential managerial career-related perceptions and problems among female logistics and supply chain decision makers, as well as to highlight career patterns of females who currently are involved in logistics and supply chain management.

Research Approach

The paper presents an exploratory approach to female career paths in logistics and supply chain. Literature studies provided the background for the main examined problems faced by the female managerial staff in logistics disciplines. On the basis of literature studies research questions were formulated. Basic information and data was obtained from the analysis of applications for the annual prize for the Best Female Manager in Logistics in Poland in the years 2011–2018. Several interviews with logistic women professionals were also conducted and were applied as case studies supporting above mentioned information.

Findings and Originality

Research indicates some main perceptions of women making their careers in logistics and supply chain management. The original approach is based on the fact that they personally report on perceived opportunities and issues shaping their choices and decisions. The career-related opportunities in logistics appear to be influenced by personal characteristics such as education, managerial status, salary, family and marital status, etc. The empirical material and interviews suggest that the main key to successful managerial career of women in logistics fields is the idea of continuous education. Women report also that they have to be prepared to larger effort than men.

Research Impact

The research serves as a pilot study to prepare further Delphi analysis of the problem. Current study explores such issues concerning women' employment in logistics management like career-related opportunities, career preparations, career progress, and career satisfaction. Despite some research in that area completed in the past, many issues require further detailed elaboration, particularly due to changing business and social environment.

Practical Impact

This paper offers useful information about real women's problems experienced while managing logistics and supply chain processes. The findings could be valuable for human resource management programs in companies, especially for recruitment and motivation. The results of research might provide some suggestions to those who plan to develop their managerial career in the logistics disciplines. Also, the study presents realistic advice to logistics and supply chain female professionals, facilitating better understanding of what room for improvement exists in the discussed field.

Keywords

women in logistics, female logistics managers, women's careers in logistics management



ENHANCING COMPETITIVITY OF MICROBREWERIES THROUGH HORIZONTAL COLLABORATION: A CO-PROCUREMENT STRATEGY

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Purpose

To establish the current upstream supply chain practices of Welsh microbreweries with a view to developing joint purchasing activities. The work identifies the extent of benefits required by the individual breweries in order to collaborate through a procurement hub. This strategic co-opetition is expected to provide a vehicle for collective bargaining of raw materials and potential for reduced inventory. It may also provide the opportunity for further collaborative activities.

Research Approach

A review of secondary data pertaining to collaborative purchasing practices will be been undertaken, with a focus on the drivers for successful outcomes versus common pitfalls. The results will be used to inform collaborative actions. In addition, a number of microbreweries across Wales have been interviewed to ascertain their preferences towards co-procurement. The research is qualitative and incorporates semi-structured interviews.

Findings and Originality

Informal collaborations occur between microbreweries but are sporadic in nature and have not led to formalised co-operative practices within Wales. This work identifies the supply network for the Welsh microbrewing sector in order to promote and establish joint procurement activities. Co-procurement increases the purchasing power of the individual microbreweries, reduces vulnerability to price fluctuations and enhances economic sustainability at an individual and cluster level.

Research Impact

Small enterprises and micro-firms are especially vulnerable to market forces and have very limited purchasing power. It may, therefore, be beneficial for these smaller entities to agglomerate to aid supplier negotiations and increase bargaining terms. Following a review of the extant literature, this work will show whether joint purchasing is desired, feasible and meets initial expectations. Horizontal collaboration, especially in terms of coopetition is a relatively unresearched area, principally because it is counter intuitive. What are the perceived benefits and costs of collective procurement for microbreweries? Are Welsh microbreweries willing to formally co-operate with their competitors in order to reduce their Cost Of Goods Sold (COGS)?

Practical Impact

There are both costs and benefits to inter-firm collaboration that need to be fully understood prior to a formalised relationship. Organisational structure, management and decision-making are all necessary components of a joint procurement strategy that require common agreement prior to being launched. This research has significant managerial implications and the outputs are set to garner support from individual businesses to work collaboratively to establish co-procurement activities.

Keywords

Coopetition, supply chain, cluster, micro-firm, craft beer.



HOW CAN WOMEN'S PARTICIPATION IN HGV COMMERCIAL DRIVING BE INCREASED TO REDUCE THE CURRENT SKILLS SHORTAGE?

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Purpose

This paper explores the reasons why there is a gap in knowledge of skills and competencies and additionally the reported low percentage of female HGV drivers. This research highlights the need for strategic expansion of logistics training and skills development initiatives in Ireland in order to sustain the high levels of import and export currently in operation in the EU. This is further emphasised by the current Covid19 pandemic.

Research Approach

The research approach used in the study resulting in this paper promotes the use of qualitative research methods to obtain a rich in-depth view exploring the issues concerning the current skills shortage. The primary level of research analysis conducted is qualitative, whereby the author conducted six in-depth interviews primarily with female drivers and one male transport manager currently working in the industry some of whom hold the required licenses but do not drive.

Findings and Originality

The various challenges that women encounter in the FTDL of the supply chain industry are identified. The dominant concerns were adaptability and flexibility within the FTDL sector in terms of working hours to achieve an acceptable work life balance.

Negative attitudes, abuse, and maltreatment outlined as gender discrimination and sexual harassment, which increases vulnerability for female drivers.

These findings along with the lack of facilities for females and the attitude towards female drivers all make for a very stressful career. It indicates the need for a better understanding for all stakeholders and this could help in the development of discrimination reduction and encourage a greater resource pool of drivers to the industry.

Research Impact

Sexual harassment in FTDL sector especially for female drivers is an issue that no one really wants to talk about. Women are a very small minority in this sector, and any sexual harassment red flags, often go unnoticed. Remedial action, of policies and society must view the importance of equality and provide equal opportunity and protection for women. Regulations need to be reformed to specifically address sexual harassment in the workplace, including penalty provisions. To overcome the shortage of truck drivers HR practises, need to be addressed to encourage millennials into Logistics and Supply Chain industry.

Practical Impact

Given the crucial nature of the FTDL in supply chain, these findings should be considered and bring into focus what needs to be addressed for drivers. These results provide confirmatory evidence that the transport industry is currently facing challenges of almost crisis proportions in the recruitment and retention of HGV drivers. The barriers identified have both societal and practical consequences to the industry. The failure to recognise harassment as a core labour right violation has widespread implications for organisations to develop policy standards prohibiting workplace sexual harassment and thus increasing the role of women in the industry.

Keywords

Logistics, Sexual Harassment, Skills/Driver shortage in road transport, Continuity of supply chain



A STUDY OF PREVAILING FACTORS DRIVING GENDER INEQUALITY WITHIN SUPPLY CHAIN & LOGISTICS LEADERSHIP ROLES DESPITE PROJECTED INDUSTRY SKILLS SHORTAGES

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Purpose

The purpose of this research is to evaluate factors driving current gender inequality within Supply Chain & Logistics leadership roles and to ask the question why these factors exist in the face of a pending leadership skill shortage within the industry. Gauging the perceived impacts among female senior management and directors to derive at how gender inequality has affected their careers within the industry. Bringing into question the awareness, at both organisational and industry level, of the need to proactively engage and tackle gender inequality issues.

Research Approach

The research approach used in the study resulting in this paper promotes the use of qualitative research methods to obtain a rich in-depth view exploring the issues concerning gender inequality. The primary level of research analysis conducted is qualitative, whereby the author conducted fourteen in-depth interviews primarily with female managers/leaders currently working in the industry.

Findings and Originality

Findings suggest that the causing factors of gender inequality within the industry are biases built on traditional stereotyping, conscious and unconscious acts and behaviours of discrimination, lack of pay parity recognition and lack of development opportunities for females. In addition, suggested gaps at industry level that compound both male dominance and culture within certain supply chain and logistics sectors are identified. They include a lack of investment in the areas of bias and gender diversity training, along with educational and promotional programmes aimed at attracting more women. The authors detected a distinct lack of research within the area of gender inequality among supply chain and logistics leadership roles with women's perspectives simply not asked for or ignored.

Research Impact

The research highlights current gender inequality levels, as experienced and perceived by a limited sample of female leaders within the industry today, in an attempt to highlight challenges faced by women striving to attain career development. By evaluating some of the factors causing such high levels of gender inequality at industry leadership level, the research seeks insights into why these high levels exist. Furthermore, the research questions the rational and sustainability of such existing levels, with the potential risk of lost benefits, coupled with current and pending leadership skill shortages within the industry. This research seeks to conceptualise a framework for further research and theory discussion.

Practical Impact

The research highlights factors causing gender inequality while offering a glimpse into the perceived benefits of gender equality. It questions the extant of industry and company's level of commitment and engagement in both recognising and tackling the issue of gender inequality. The research offers insight into the challenges faced by female leaders with long time experience in the industry. The research explores whether enough is being done to proactively to address the issue and is there a concreted effort at industry level to attract more women into supply chain and logistics careers as a result.

Keywords

Gender Inequality, Pay Parity, Opportunities, Stereotyping, Logistics leadership, Discrimination



THE PERFORMANCE IMPACT SUPPLY CHAIN FINANCE PRACTICES IN THE EXTENDED SUPPLY CHAIN NETWORK: SUPPLIER- AND CHAIN-LEVEL PERSPECTIVES

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Purpose

In this paper, we analyze the performance impact of supply chain finance-practices (SCF-practices) on the inter-organizational supply chain network level. Expanding the unit of observation to the supply chain network level is important because SCF-practices do not only optimize the working capital assets of a single (focal) company but also the intertwining financing relationships with affiliated up- and downstream supply chain partners.

Research Approach

The paper follows an exploratory multi-methodological research design. In particular, three research phases can be distinguished. First, expert interviews were used to create a sample of companies using (and not using) SCF-practices. Second, supply chain relationship data on the Bloomberg Terminal is exploited to identify upstream supply chain partners. Third, various cross-sectional and panel regression analyses were performed to isolate the performance impact of SCF-practices.

Findings and Originality

In contrast to previous studies, this paper is based on a unique data set, allowing the extended upstream supply chain network of focal companies to be included in the empirical analysis. As a consequence, multiple performance effects along two supply chain stages are revealed that were previously unknown.

Research Impact

Several content-related and methodological contributions are made to the body of SCF-related research. Most importantly, the paper challenges the widespread assumption that SCF results in a “win-win” situation for buyers and suppliers. Instead, it is argued that due to the low scalability of the financing volume, SCF should rather be seen as a “win-neutral” concept, allowing companies to mitigate the negative consequences of payment term extensions.

Practical Impact

The paper at hand makes several noteworthy contributions to practice. For instance, valuable implications can be derived for SCF-providers who want to differentiate themselves from competitors by offering more scalable SCF-practices. By broadening the perspective towards a focal company’s extended supply chain network, the paper also provides a more nuanced explanatory approach of why many suppliers are still reluctant to adopt SCF practices.

Keywords

Supply chain finance, Performance, Structural embeddedness, Supply chain network



HORIZONTAL LOGISTICS COLLABORATION IN FOOD SUPPLY CHAIN: AN ANALYSIS OF MOTIVES AND ENABLERS

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Purpose

This research aims to gain insight into the motives and enablers that influence the feasibility of Horizontal Logistics Collaboration (HLC) in the food industry.

Research Approach

The main methodology in this study is developing a survey –based on the theoretical framework-that is distributed among food logistics/SC experts (including shippers and third-party logistics companies) and the statistical analysis to get insight on the relevance of motives/enablers for horizontal collaboration in food chains and the factors that influence that.

Findings and Originality

The analysis of the survey shows that the “cost-oriented motives” received the strongest supports, which is potentially caused by low profit margin and fierce price competition in the food and logistics sectors. In contrast, the “market-oriented motives” – like access to new market areas via collaboration- had a lower evaluation. For enablers for collaboration, “Incentive alignment” has received the strongest support which implies the necessity of designing fair incentive mechanisms for horizontal collaboration. Besides, the strong support for “compatibility” – including “product compatibility” and “ logistics compatibility” - reveals the importance of partner selection for a feasible collaboration in food chains. In terms of company size, larger companies valued the “decision synchronization” and “compatibility” more as enabling factors. Due to the common power asymmetry in the food industry, SMEs are forced to be flexible and adaptive in a collaborative relationship. So, they are willing to look into more possibilities of selecting partners. Also, SMEs underpinned the “size similarity” as an enabler, revealing their concerns about not being heard in a power-imbalanced relationship. Finally, larger companies prefer to formalize the contract as the legislation mechanism, while interpersonal and inter-organizational trusts are highlighted as the prerequisite of collaboration by SMEs who operate their logistics activities in a more informal way.

Research/Practical Impact

The findings provide the theoretical insight and practical guideline for practitioners to understand the critical factors and achieve feasible/successful operations of HLC in the food industry.

Keywords

Horizontal Logistics Collaboration; Food Supply Chains; Survey research.



COLLABORATIVE INVENTORY FINANCING IN SUPPLY CHAINS: WHAT IS WRONG WITH THE HOLY GRAIL OF SUPPLY CHAIN FINANCE?

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Purpose

While technological developments have enabled the diffusion of collaborative accounts receivable and payable-based SCF-practices, regulatory requirements and complex operational integration of external service providers (e.g. logistics service providers, fintechs or banks) have limited the expansion of collaborative inventory financing SCF-practices. The objectives of this paper are to structure the problems surrounding collaborative inventory financing practices (RQ1) and to provide potential justifications why collaborative inventory financing is legitimate, needed and a way to significantly improve supply chain performance (RQ2).

Research Approach

To meet these objectives, we have applied an inclusive, cyclical and multilevel research approach. Inclusive because we capture multiple perspectives on inventory financing, cyclical because we have multiple points of contact with the consulted experts at different points of time and multilevel because we consulted experts both individually and in groups. Furthermore, we apply cognitive mapping methodology and SODA as it is used by Eden et. Al (2004). This is because problems as they are faced by organizations can be interpreted as psychological constructs that are defined and framed in the eye of the beholder. Our analysis is therefore based on the assumption that although the experts have different perspectives on collaborative inventory financing practices, it is possible to understand them rationally.

Findings and Originality

The manuscript is a response to the call for more inter-disciplinary research on inventory financing research that considers both operational and financial collaborative aspects equally. The analysis reveals that collaborative inventory financing can be viewed as a tango between supply chain internal players (buyers and suppliers) and supply chain external players (banks, LSPs etc.). Just as in dance, coordination and orchestration between those supply chain internal and external parties is necessary.

Research Impact

Experience in operations and management science suggests, that once usefully structured, a problem is already half solved. Furthermore, the manuscript also discusses the following important questions: What is a company and what are its boundaries? And what is the optimal relationship between inventory control and capital efficiency (off-balance)?

Practical Impact

The cognitive map derived from the analysis might lead to agreed action across all relevant stakeholders.

Keywords

Inventory financing, supply chain collaboration, supply chain finance



INNOVATIVE TECHNOLOGY



THE INFLUENCE OF ONLINE REVIEW ADOPTION ON THE PERFORMANCE OF CAPACITATED SUPPLY CHAINS

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Purpose

The development of e-commerce in the last decade has witnessed the importance of online reviews in affecting customer choice. Through online reviews, customers can access more information about products than is conveyed in the manufacturers description, from a broad range of alternate sources. Although the influence of online reviews on customer decisions has been well investigated from marketing and management information system perspectives, less research linking online reviews and supply chain management has been conducted. Therefore, the aim of this study is to investigate the influence of online reviews on the performance of a capacitated supply chain.

Research Approach

An automatic pipeline variable inventory order-based production control system (APvIOBPCS) with supply constraints is adopted to model a capacitated supply chain, while consumer choice modelling based on customer utility is developed to model the influence of online reviews. By integrating two models, this paper uses supply chain profit as the performance indicator to examine the influence of online reviews on supply chain. Simulation experiments are conducted, and effects of several independent variables including online review adoption, supply constraint, customer quality estimation and lost sales penalty are explored.

Findings and Originality

In general, the adoption of online reviews can support higher average supply chain profits for firms. However through a thorough analysis of the results, we find that in some specific independent variable combinations this is not necessarily the case. In other words, the different levels of contextual factors can moderate the influence of online reviews on supply chain profits, and online reviews can decrease supply chain profits sometimes.

Research impact: To the best of our knowledge this paper is the first attempt to link online reviews with capacitated supply chains. The detailed investigations within this study demonstrate clear linkages between online reviews and supply chain profitability, providing a new perspective with which to examine the value of online reviews for E-commerce.

Research Limitations/Implications

In this paper, we only consider the forward supply chain, but fail to include the reverse flow of the goods. In addition, we assume that the online reviews are all posted by customers without any strategic manipulation, which might not be always true in E-commerce sites.

Practical Impact

The identified influence of online review adoption can inform companies and practitioners on the usage of online reviews as a strategic tool to maximise supply chain profit. In turn, we suggest this also leads to implications that policy makers need to consider in customer welfare.

Keywords

Online reviews, supply chain capacity constraint, inventory management



PREREQUISITES OF E-COMMERCE PLATFORMS

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Purpose

Electronic commerce has come a long way in the last quarter of a century. The information and communication technology solutions, which initially drove this development and facilitated e-commerce transactions, were largely proprietary and individually designed and programmed software. However, the continuing trend towards digitalization and the consequential need for enhanced e-commerce activities has led to the emergence of platforms that dominate and influence the industry. Advantages of platforms include standardization and facilitating digitalization, such as information logistical handling, networking, interactivity and immediacy.

In addition to the general digitalization trend, there are always business processes that cannot be mapped in IT. This occurs particularly when specific business models are novel and not accommodated yet in e-commerce solutions.

The decision to develop new software in-house may not only be due to the lack of finding suitable alternatives in the market. It may be made with regard to the possibility of also offering a dominant platform solution in the future.

Here it becomes important to understand, which factors contribute to the success of platforms.

Research Approach

The paper evaluates 20 e-commerce platforms available in the market. The evaluation is a practice-based research, including an analysis of recent literature on platforms, evidences collected by the authors and complemented by an analysis of current trends. Criteria include setup and further development of the e-commerce platform, its components, interfaces and continuing advancement. These are complemented by social interaction opportunities and e-service quality. The evaluation, thus, considers the perspectives of providers and potential producers and consumers.

Findings and Originality

We expect that open standards are progressing fast and will surpass proprietary solutions. Retailers, who open up their retail architecture and collaborate both ways with other services, will generate benefits. New services will emerge at the interface of retail and online interactions. Thus, open platforms enhance the primary e-commerce activities and the value chain of a company.

Research Impact

The paper contributes to the knowledge concerning platformization and open standards and enhances the understanding of innovation processes.

Practical Impact

The paper also contributes to better decision-making in business and industry. Accordingly, managers will push to implement the features that are seen as success factors in the development and implementation of e-commerce software. The results will streamline business operations and boost economic growth.

Keywords

e-commerce, platform economy, business software, digitalization



THE USE OF PRESCRIPTIVE ANALYTICS IN THE SUPPLY CHAIN

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Purpose

Supply chain are faced with a number of challenges, some of which being related to complexity, data, changes in operations that may result in changes to their structure and information flow. It is crucial that the link between the information and physical flow is robust and is being supported by the latest analytical tools and techniques that make use of the data available to them. The aim of the paper is twofold: (1) to take a critical view on how Prescriptive Analytical tools and techniques are being considered and implemented in the supply chain and (2) to challenge the current research agenda in the field of supply chain analytics.

Research Approach

To carry out this study, an evaluation of published systematic literature reviews (SLRs) is considered that aims to emphasise which Prescriptive Analytical tools and techniques are currently being adopted in supply chain systems. A set of SLRs published over the past ten years are been identified, where their approach, application and outcomes are being challenged.

Findings and Originality

This work takes a critical view of understanding the opportunities offered by SLRs in the context of supply chain analytics. Different areas of research have benefited from the use of a systematic literature review approach, still there are a number of different characteristics of how SLRs have been used. The purpose is to bring forward a number of different examples of SLRs used in the field of supply chain and take a critical view on their use and applicability that forms a new research agenda to the field of supply chain analytics.

Research Impact

This work brings theoretical contributions to the field of business analytics, supply chain analytics and SLRs methodologies in this field. The type of information extracted from a SLR is to be evaluated, where the approach used to design and conduct a SLR is critically discussed.

Practical Impact

This paper offers practical impact by highlighting the challenges and opportunities offered by the implementation of different Prescriptive Analytical tools and techniques that could have a shorter or longer impact to an organisation when implemented in practice.

Keywords

Supply Chain Analytics, Systematic Literature Review, System Complexity



A ROADMAP FOR THE IMPLEMENTATION OF THE SUITABLE TECHNOLOGY SUPPORTING BUSINESS PROCESSES IN THE ELECTRONICS SUPPLY CHAIN

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Purpose

Technological innovation in the supply chain has become crucial since it allows reaching improvements in efficiency and effectiveness in managing physical, information, and financial flows. Alongside the productivity gains, the changes that new technologies can entail in the relationship structure – among suppliers, producers, distributors, intermediaries, and final customer – and in the companies' strategic choices are extremely significant. Technology facilitates the acquisition, the use, and the management of inter-organizational information, letting actors coordinate and reduce the mismatch between demand and supply, preventing the expensive waste of inventory and efforts. Nevertheless, the adoption level of e-business tools in the supply chains is still low. This work aims to contribute to knowledge in the field of e-supply chain management. The potential influence of the e-supply chain is reviewed through the definition of a theoretical framework, operating as a roadmap in the electronics industry to suggest suitable digital tools that companies can implement to increase their efficiency and effectiveness and to help them in their strategic decisions.

Research Approach

To reach the research goal, the study attempts to endow the extant literature by proposing a theoretical framework, which aims to suggest the adequate digital tools for companies, through the identification of the factors that affect the e-supply chain tools adoption. To support the model development and application, three methodologies were used (literature review, semi-structured interviews with practitioners, and analysis of secondary sources). Besides, validation of the model is tested through some realistic cases.

Findings and Originality

Based on the different combinations between the different variables that compose the framework, a suitable digital tool is suggested to support the communication between the business partners in the supply chain. The model provides a roadmap to identify digital tools supporting the relationship between firms, to benchmark companies with their main competitors, and to find interesting solutions for driving the change.

Research Impact

On the academic side, this work contributes to enriching the extant knowledge about e-supply chain management, through the involvement of practitioners in the study. It develops a comprehensive roadmap to depict all the variables affecting the e-business supply chain technology adoption and the decision of the implementation in the electronics industry.

Practical Impact

On the managerial side, this paper offers a useful tool for practitioners aiming to implement digital solutions supporting business processes. As a matter of fact, they may rely on the proposed framework to evaluate the convenience of the adoption and to pinpoint the suitable tool according to their characteristics.

Keywords

e-supply chain, digitization, roadmap.



SOCIO-TECHNICAL TRANSITION IN PORTS: A LATENT DIRICHLET ANALYSIS AND NETWORK ANALYSIS OF RESEARCH IN AUTOMATION AND DIGITALISATION

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Purpose

Seaports, as vital nodes in international transportation and logistics, are undergoing significant developments in transitioning towards a new generation of operational systems and management practices, which are characterized by full automation and complete connectedness through digitalisation. This transition may result in significant improvements in operational performance, as intended by terminal operators. However, there are also significant concerns that the transition to these new approaches will have a substantial impact on the employment of port workers and the conditions under which they work, and more broadly, safety and security within the port system. It is therefore suggested that in order to understand the impacts of this level of change, a socio-technical analysis which addresses technical developments within the context of a multi-level perspective is used to assess the transition of port operations to full automation and digitalization.

Research Approach

An important question which needs to be addressed is whether the perspective of various stakeholders including port workers are considered in maritime research, and if so how. This study identifies key research topics and areas in port automation and digitalization using latent Dirichlet allocation (LDA) and Network Analysis of keywords from academic literature identified using the SCOPUS database. Text mining and topic modelling are adopted using R packages. Two groups of port studies literature are compared: (1) First using the keywords related to ‘automation’ and ‘digitalization’ and (2) second using port worker-related keywords: ‘labour’, ‘employment’ and ‘social’ ‘impact’.

Findings and Originality

This study shows that socio-technical transition theory provides a useful approach in helping to understand the transition of port operations to automation and digitalisation. The findings from the bibliometric analysis highlight that there is a lack of consideration of the perspective of port workers in the academic literature relating to this area. While port studies in general are concerned about the impact of port (administration or labour) reforms on social status and job security of port workers, studies in port automation and digitalisation are seldom concerned about the social impact including port workers focusing on automation equipment, terminal layouts and their impact on operational performance. This study uses text mining and topic modelling techniques that are rarely used in maritime studies, providing researchers with further possibilities to analyse the structure of research topics and themes, and a more focused approach to doing so.

Research Impact

In addition, this paper discusses how Socio-Technical Transition theory can be used to understand technical developments taking place within port operations. The findings contribute to the wider debate on the impact of automation and digitalization on port operations.

Keywords

Port Automation, Digitalization, Port worker, Keywords Analysis, LDA, Network Analysis



SUPPLY CHAIN ANALYTICS ADOPTION CHALLENGES AND BENEFITS: A SYSTEMATIC REVIEW OF THE LITERATURE

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Purpose

Industry and academia recognise the role of supply chain analytics (SCA) in enabling data interpretation towards informing decision-making processes from an end-to-end network perspective. Notwithstanding the potential benefits associated to the adoption of SCA, only a limited number of companies adopt analytics owing to fundamental organisational, cultural and technical challenges. This research explores the challenges influencing SCA adoption and the benefits deriving from embracing data analytics in operations.

Research Approach

A systematic literature review was conducting to explore the state-of-the-art research advancements in SCA. In particular, 27 peer reviewed articles were collected from Scopus and Web of Science databases, and were further included in the analysis. Thereafter, a thematic analysis of the reviewed articles was performed to identify and categorise factors hindering the adoption of SCA, along with benefits. Specifically, the categorisation of adoption challenges was based on the Technological, Organisational, Environmental (TOE) framework.

Findings and Originality

Drawing on the TOE framework, 23 factors were identified as the main inhibitors of SCA adoption, indicatively including: accessibility to real-time and accurate information, and network partners’ willingness to share digital infrastructure. Regarding the emanating benefits, two main implications of SCA adoption emerged, namely: (i) enhanced performance (e.g., supply chain efficiency); and (ii) competitive advantage (e.g., enhanced collaboration).

Research Impact

Regarding the literature pertinent to SCA, most of the extant studies in the field of supply chain management focus on the identification of capabilities that determine the maturity level over SCA adoption and implementation along with the associated implications (e.g., performance, transparency). This research comprises the first study attempting to identify the challenges hindering SCA adoption, as well as distilling the expected benefits.

Practical Impact

On the evaluation of SCA adoption, supply chain managers should concentrate on aspects other than technological competence as evidence demonstrate the important role of other factors as well. Organizations looking to adopt SCA can consider every factor elicited, hence effectively making adoption decisions easier and faster.

Keywords

Supply Chain Analytics; Supply Chain Management; TOE; Analytics Adoption Challenges



MIND THE GAP: THE INTERFACE BETWEEN AUTONOMOUS VEHICLES AND THE LOGISTICS SYSTEM

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Purpose

Using autonomous vehicles in goods transport has potential benefits. However, the transition to a future autonomous (and electric) freight system needs to take account of the interface between the vehicle and other parts of the logistics system in order to exploit potential benefits and overcome challenges related to the absence of a driver. The purpose of the research is to identify the prerequisites for achieving automated loading, unloading, related information handling and in-plant transport at these interfaces.

Research Approach

Cases studies consider senders and receivers of various products as well as organisations that have a role including real estate companies that develop warehouses and terminals. The case studies consider vehicle and handling equipment technology alongside the processes that may need to change if the efficiency gains of an autonomous vehicle are to be realised. Research questions are addressed at the logistics system level. The cases studies combine questions about logistics process and technology alongside those concerned with underlying business models.

Findings and Originality

Results presented are at the half way stage of a two-year project and will be based on the initial series of interviews for four case studies. Findings so far include: (1) lack of development in this topic compared with interest in autonomous and automated transport (2) importance of organisational issues in the logistics chain e.g. contractual relationships (3) importance of taking a broad view of the companies that need to be involved (4) product type and characteristics are important but other factors may have more influence on the scope to develop initiatives in this area.

Research Impact

The research provides insights into the complexity of the interfaces in autonomous and automated transport and logistics systems. The empirical findings enrich the discussion of this field. Combining insights from logistics, technology, materials handling and business has demonstrated the benefits of an interdisciplinary approach.

Practical Impact

Autonomous transport systems may bring many commercial benefits. However, the scale of these benefits will be significantly diminished if questions about the interface points in the logistics system are not addressed. The outputs of the research will provide important insights for managers addressing these challenges.

Keywords

Autonomous trucks, automated handling, business models, logistics systems



AN EMPIRICAL INVESTIGATION INTO THE IMPACT OF DIGITALIZATION ON GLOBAL SUPPLY CHAINS

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Purpose

Our study aims to generate new insights into the impact of digitalization on the design and management of global supply chains. It has a particular focus on understanding the current adoption rate of a range of existing and emerging digital technologies in global supply chains, identifying perceived opportunities and challenges, and clarifying the key factors driving (and inhibiting) their deployment.

Research Approach

The research is largely exploratory in nature, adopting a mixed methods approach. Phase 1 of the project is administered as an online survey with a global sample of respondents from various supply chain functions. In phase 2, the survey results are further investigated through semi-structured expert interviews, shedding light on company motivations and implementation approaches.

Findings and Originality

Phase 1 has already been completed. We find significant differences in adoption patterns between company sizes and a widening gap (or a “digital divide”) between leaders and laggards in terms of technology adoption. Perceived benefits and challenges also differ significantly between companies of different sizes. The study covers a wide range of existing and emerging technologies and shows that adoption patterns are very diverse across different technology types. Phase 1 results also suggest that there is a significant correlation between adoption of digital technologies and different dimensions of company performance. These preliminary findings will be further elaborated on in phase 2.

Research Impact

Our research provides an up-to-date overview of adoption rates across company types and countries as well as a deeper understanding of drivers and inhibitors behind these adoption patterns.

Practical Impact

Practitioners can use our research results for benchmarking their own company’s position along the adoption continuum and can draw lessons for further digitalization initiatives from the identified challenges and adoption approaches.

Keywords

Supply Chain Management, Digitalization, Technology Adoption, Global





LOGISTICS AND TRANSPORTATION MODE



AN ANALYSIS ON THE HANDLING OF CITRUS FRUIT REEFER CONTAINERS IN THE DURBAN CONTAINER TERMINAL

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Purpose

Despite continuous research conducted to minimize the occurrence of temperature breaks along the export cold chain, concerns have been raised over logistical issues experienced in the South African fruit industry, specifically the port terminals. This study focused on the Durban Container Terminal (DCT), within the Port of Durban. The DCT is the busiest container terminal in Africa and handles more than 50% of citrus fruit export volumes. Poor turnaround times due to road congestion, lack of cold storage facilities, a slow development of port infrastructure and a shortage of port equipment compromise the efficiency of the citrus cold chain; thus, reducing the probability of increased foreign earnings and further resulting in food wastage. These challenges spurred on this research.

Research Approach

A power analysis derived that a minimum of forty-four containers would need to be monitored to ensure the validity of the study. To further support the study, temperature experiments were performed in cold stores, observations were conducted in the DCT, supply and return air temperature data were collected from shipping lines and Transnet Port Terminals (TPT) and questionnaires were distributed to industry members. The purpose of this was to investigate whether the fruit met steri-market protocols prior to loading, to determine the current state of the processes and operations in the DCT and to determine whether any temperature breaks and/or chilling injury occur in the DCT phase of the citrus cold chain. If temperature breaks were identified, to determine the location, duration and frequency of the temperature breaks and/or chilling injury.

Findings and Originality

Although the container data documented the temperature of the fruit from loading at the cold stores until the Port of Destination (Hong Kong and China), the data analysed focused solely on the DCT phase of the citrus cold chain. The observations made revealed that personnel lacked the skills to handle the fruit superiorly as well as there being poor strategy implementation in an effort to improve terminal operations.

Research Impact

This study was undertaken to redress the operational challenges experienced in the DCT and to improve the overall efficiency of the citrus cold chain.

Practical Impact

Although this study was a step in the right direction, further research needs to be done on all stages of the export cold chain under cold sterilisation treatment.

Keywords

Chilling injury; Citrus; Cold chain; Container; Durban Container Terminal (DCT); Fruit; Temperature breaks.



REAL-TIME INFORMATION AS COORDINATION MECHANISM FOR OPERATIONAL DISRUPTIONS IN INTERMODAL HINTERLAND TRANSPORT

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Purpose

Environmental intermodal solutions for port hinterland transport involve numerous actors and activities that increase the operational uncertainty compared to the use of only road. Real-time information provides possibilities to improve disruption management by coordination of actors' activities and resources in a logistics system. Therefore, the purpose of this paper is to explore how actors involved in intermodal hinterland transport coordinate their logistics activities and resources via real-time information in order to mitigate impacts from operational disruptions in intermodal solutions.

Research Approach

A case study approach is adopted to get in-depth understanding of coordination between different actors' activities and resources in a hinterland transport system when managing disruptions. Data is collected via semi-structured interviews with logistics managers and planners to capture the use of real-time information as a coordination mechanism for management of disruptions in day-to-day operations.

Findings and Originality

The results show how the coordination of logistics activities and resources are performed, from the perspective of disruption management. Moreover, the results provide insights on how the actors use coordination via real-time information to mitigate impact from operational disruptions. This paper provides input for operational disruptions where information for coordination on a day-to-day basis is studied. This is in contrast to the main perspective in the literature of coordination at a strategic level.

Research Impact

The study is limited to a single case study, for a limited period of time, with intermodal transportation from a port to a distribution centre. The involved actors are limited to the company buying the products, a logistics service provider, a rail port operator and transport operators.

Practical Impact

The paper could support managers to improve the disruption management by understanding the use of real-time information for coordination of activities and resources for intermodal hinterland transport solutions.

Keywords

Operational disruptions, real-time, information, hinterland transport, coordination



TEMPERATURE PROFILE MAPPING OF THE DOMESTIC TRANSPORTATION OF APPLES IN SOUTH AFRICA

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Purpose

South Africa has a well-established apple industry and is the second largest exporter in the Southern Hemisphere (in tonnage, after Chile). On average, 44% of South Africa's apple produce is exported, 25% is sold on local markets and to supermarkets directly, and the remainder is either processed or dried. Although less than the exports, local sales still amounted to approximately 200 000 tons in 2018. The fruit export industry is well regulated, while quality control and transport protocols for fruit that are destined for local markets are less clear. The focus of this study is on the domestic transportation of apples from the production region to the market region over a distance of approximately 1 400 km. Currently, apples are transported in refrigerated trucks with the cooling unit switched on, incurring an additional cost to run the refrigeration unit. The purpose of this study is to investigate whether shipments could be sent uncooled during certain times of the year, thereby reducing the transportation cost, while still maintaining acceptable temperature levels inside the trucks to ensure the quality of the produce is maintained to acceptable standards.

Research Approach

The research will make use of both primary and secondary data with a deductive, mixed methods approach. Firstly, the researchers aim to identify what the minimum requirements are for domestic apple shipments, in comparison to the strict export regulations. Secondly, recordings of the ambient temperature from both the inside and outside of refrigerated trucks will be compared for both cooled and uncooled shipments over the duration of the journey.

Findings and Originality

Initial findings indicate that uncooled shipments are influenced by the outside ambient temperature but given the relatively short duration of the journey (compared to export shipments), it does not appear to have a severe negative impact.

Research Impact

Given the relatively low research focus on domestic fruit supply chains in South Africa (compared to exports), this study aims to contribute to filling a current gap in knowledge and to establish a starting point for future research.

Practical Impact

From a managerial perspective, the potential total cost savings (through sending uncooled shipments) over an entire season is enough to warrant further investigation into this decision.

Keywords

apples, cold chain, temperature, South Africa, domestic transportation;



IDENTIFYING AND COMBATting BARRIERS TO ENVIRONMENTALLY SUSTAINABLE AVIATION IN DEVELOPING COUNTRIES

May 19, 2020.

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Purpose

Care for the environment by businesses is undoubtedly, a public value practice. Noting the Common but Differentiated Responsibility concept in global climate management, this paper is a product of a research which sought to measure the depth of belief and commitment of developing countries to the ideals of environmentally sustainable aviation, as a public value act, and as a panacea for a sustainable planet. Driving this objective is an underlining intent to know and promote sustainable aviation practice in the developing economies, possibly to encourage them to mirror the practice in the developed world. This research thus x-rayed such belief and commitment by looking at the case of Nigeria, a developing country with estimated 200 million population (7th world most populous country) and arguably the biggest economy in Africa.

Research Approach

The study is an exploratory qualitative research adorning Action/ Policy credentials given its intent to influence a change in how developing countries dispose themselves to sustainable aviation practice.

Findings and Originality

The study found that faced with a number of domestic challenges, a developing country like Nigeria prioritises her local sectoral challenges over the prominence which the world expect her to accord environmentally sustainable aviation practice. Interestingly, the causes of this disposition were unearthed, just as possible solutions to reverse the situation were identified.

It can be unequivocally declared that this study is absolutely original. While scholars have researched diverse subjects of interest regarding the Nigerian aviation sector, none has attempted to know how the sector fairs in term of sustainable practice. This much was well evidenced by lack of literature on this subject, and participants in the primary research repeatedly described this study as an uncharted water as far as Nigerian aviation is concerned.

Research Impact

This effort addressing a topical issue affecting the world 7th most populous country, and to a large extent with findings reflective of most developing nations, is a major contribution to knowledge that will enhance global understanding of sustainable aviation practice in our present interconnected world. An interconnection that has recently being further highlighted by the Covid-19 pandemic.

Practical Impact

The dissemination of the findings of this research is among others, strategically aimed at influential Nigerian aviation stakeholders who are capable of promoting and improving sustainable aviation in Nigeria, and potentially, other developing countries.

Keywords

public value, environmentally sustainable aviation, developing economies, local challenges, Nigeria.



A COMPARATIVE CONTENT ANALYSIS OF THIRD PARTY LOGISTICS PRACTICE IN THE UK AND NIGERIA

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Purpose

This research consists of a comparative content analysis of third party logistics practices in the UK and Nigeria. Third party logistics (3PL) is the practice of outsourcing some or all of a company's logistics activities (such as warehouse design, warehouse build, warehouse management, inventory management, customer service, transportation and distribution) to a logistics providing company on a contract basis. Based on preliminary research, it is found that logistics outsourcing has not been as well adopted in developing countries like Nigeria in comparison with more advanced economies like the UK. Literature shows that logistics outsourcing is seldom used by companies in Nigeria and that there is a dearth of academic research in the area of logistics outsourcing in Nigeria. This research paper aims to compare the barriers to further logistics outsourcing activity in Nigeria and the UK as a first indicator of the reasons why it is not so prevalent in Nigeria.

Research Approach

An exploratory content analysis was carried out using secondary data from various sources both from the UK and Nigeria. The data was gathered from UK logistics industry reports, UK contract logistics company reports, academic papers and Nigerian logistics risk reports. The data covers all areas of 3PL practice in the UK and Nigeria albeit very limited data about 3PL practice in Nigeria was available.

Findings and Originality

A number of barriers were identified and ranked in terms of the extent to which they currently impede the further use of third party logistics providers in Nigeria. The UK logistics market was examined for evidence of any of the same barriers with a few appearing albeit to a lesser extent. Also, the findings show that UK logistics industry is more mature than the Nigerian logistics industry and that UK contract Logistics Companies are ranked amongst the top logistics companies globally. Further evidence shows that UK logistics industry is forecasted to continue to grow despite some mild challenges relative to the Nigerian case which does not show a significantly promising future. Also, the core reasons for outsourcing such as efficiency, cost saving and the need to focus on core competencies continue to be the reasons why companies outsource their logistics in the UK. There are currently no clearly established reasons why some companies outsource their logistics in Nigeria with the major part of 3PL customers in Nigeria coming from the informal sector.

Research Impact

While academic literature has argued that logistics outsourcing is less practiced in developing countries than in developed countries such as the UK, other European countries and the USA, not many have been able to provide an explanation for the difference in levels of logistics outsourcing practice between a developing country such as Nigeria and a developed country such as the UK. Secondly, the research will contribute to knowledge and academic literature on logistics outsourcing in Nigeria. Also, this exploratory research paves the way for further research into the third party logistics market in Nigeria.

Practical Impact

The results from this study highlight the main barriers to further use of logistics outsourcing in Nigeria and the UK. The results from this study will also be used to inform the development of a Nigeria specific decision support framework for organisations in any industrial sector wishing to contemplate the use of third party logistics products and services in Nigeria.

Keywords

Third party logistics, logistics outsourcing, developing countries, developed country, Nigeria, UK, content analysis.



GROWTH STRATEGIES IN LOGISTICS SUPPLY NETWORKS: AN ERBV PERSPECTIVE

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Purpose

Increasingly supply networks are recognised as the most meaningful level of analysis in many industries. Yet few studies examine the additional capabilities and revenue options generated by such alliancing. ERBV is one perspective that addresses how these supply networks related opportunities can create competitive advantage. The ERBV perspective and notion of relational rents is used empirically to understand three distinct port supply network strategies.

Research Approach

A qualitative research methodology was adopted to investigate a dynamic and complex research phenomenon in-depth, and to provide clarification concerning the actors and mechanisms that create an augmented offering within a dynamic environment. In this study, the unit of analysis are capital intensive service providers that want to expand within supply networks using VAS. Following a disciplined desk-based identification of companies that met the specified company selection criteria, 25 unstructured interviews among 18 organisations were conducted.

Findings and Originality

Whilst this study is confirmatory regarding the basic tents of ERBV, beyond studying ERBV in a new context the study contributes to theory by reporting that, paradoxically, temporary relational rents can be generated without close partnerships

Research Impact

This study used ERBV to understand and offer prescriptive advice on, the expansion strategies of UK ports, where new levels of service are offered at, or close to, the port. The study also identifies that the organisational capabilities of network partners can assist the differentiation strategy of the firm.

Practical Impact

The research findings have clear implications for how ports should adopt growth strategies in the UK

Keywords

Ports, Extended resource base view, logistics value added services.



JUST DO GOOD THINGS AND TALK ABOUT? THE STATE OF SUSTAINABILITY REPORTING BY LINER SHIPPING OPERATORS

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Purpose

Until recently, most liner shipping operators were not too transparent about their performance in terms of the triple bottom line (i.e. social-environmental-economic dimensions). However, constant pressure by stakeholders and joint work in the context of the Clean Cargo Working Group (CCWG) seem to change their habits. By 2018, almost all top liner shipping operators delivered as least some sort of sustainability reporting to the public. While employing qualitative data analysis software to conduct a thematic content analysis, the aim of the paper is to examine systematically structural patterns and recurrent themes in their communication along the triple bottom line in the maritime shipping domain supplemented by a stakeholder perspective in line with Global Reporting Initiative (GRI) and/or Sustainable Development Goals (SDGs) guidelines.

Research Approach

Sustainability reporting activities by top 50 liner shipping operators in form of sustainability reports or environmental/social responsibility reports are inspected by means of thematic content analysis in order to reveal core themes and work out structural patterns.

Findings and Originality

Between 2016 and 2018, 57 publications of sustainability reporting from 22 liner shipping operators were identified with diverse contexts of reporting practice impacting depth and breadth of content dealing with social, environmental and economic performance subject for further analysis and discussion.

Research Impact

The assessment of sustainability reporting of liner shipping operators gives in sights in their reporting practice and core themes dealing with.

Practical Impact

Spread of best practices and a development of common guidelines should enhance the quality of future sustainability reporting in liner shipping.

Keywords

Liner shipping, sustainability reporting, thematic content analysis, Clean Cargo Working Group (CCWG), Global Reporting Initiative (GRI), Sustainable Development Goals (SDGs)



A REVIEW OF THE CHALLENGES OF UTILISING INLAND WATERWAYS FOR FREIGHT TRANSPORT AND FUTURE PERSPECTIVES FOR THE UK

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Purpose

Transport by Inland Waterways is an alternative and very energy-efficient way of transporting goods. It plays a key role in connecting inland terminals with global supply chains by providing a reliable, safe, low-cost and environmentally friendly transport for freight.

This paper aims to examine the feasibility of using inland waterways in two geographical areas of interest within the UK for the shipment of palletised freight in serving different industrial sectors. Also, under examination is the potential of overcoming many current limitations on logistics operations by adopting information technology to enhance supply chain visibility through traceability and data acquisition, to strengthen security along the supply chain as well as to manage freight flows through an advanced transport platform.

Research Approach

This research study is exploratory in nature. The paper presents a survey based on previously published literature, statistics and publicly accessible documents on Inland navigation in continental Europe and the UK in order to have a holistic understanding of the historical developments, state-of-the-art with regards to freight transportation and the respective infrastructures investments made by the government. Workshops, site visits and interview have been directed with various players in the sector (Smart Track 4 Waterway Team – Interreg EU Project, Canal and River Trust UK.)

Findings and Originality

The significant features of the transport system highlight that improvements in the sector can be enhanced by adopting current best practices. The originality of this paper lies on the presented finding of current limitations on logistics operations for IWT, approaches for identifying goods flows to achieve a real modal shift to waterways on the Aire & Calder Canal linking the Humber Estuary to the industrial conurbation of Leeds and Bradford cities as well as the Manchester Ship Canal (MSC) starting from the Mersey estuary right into the centre of Manchester.

Research Impact

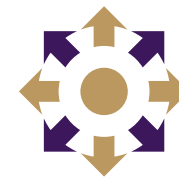
This study serves as a groundwork for conducting future research work in the area of inland waterways that will support its further development and possible integration into the multimodal supply chains. The study also complements the existing body of literature in the field of IWT by increasing the level of awareness about small waterway transport opportunities in these areas.

Practical Impact

Findings from this research studies can help increase stakeholders knowledge on IWT and support logistic managers that decide about modal shifts realise a real modal shift by introducing new and proven logistic technologies to manage freight flows.

Keywords

inland waterways, freight transport, smart tracking and tracing, alternative transport system, Inland navigation



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