INTERNATIONAL SYMPOSIUM ON LOGISTICS

Abstracts of papers presented at the 24ᵗʰ International Symposium on Logistics (ISL 2019)

Supply Chain Networks vs Platforms: Innovations, Challenges and Opportunities

Würzburg, Germany
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INTRODUCTION

We are delighted to welcome our friends and colleagues, both old and new, to the 24th International Symposium on Logistics in the historic location of Würzburg, Germany. Würzburg offers a special mix of culture and ambiance, of world heritage and wine festivals, of modern and classical music, of avant-garde and age-old traditions, of sciences and party atmosphere that make this city popular. The stunning historical architecture provides the perfect setting for everything Würzburg has to offer: The Residenz Palace, a UNESCO World Cultural Heritage Site, the view from the Fortress Marienberg across the many towers rising above the city – the cathedral, the Marienkapelle, the town hall, and the Käppele. Quaint restaurants and traditional wine taverns offer local products (Würzburg is one of the best wine-growing regions in Germany). It is also home to about 36,000 university students. Wilhelm Conrad Röntgen once taught here and discovered X-rays that have transformed our lives. Over the years, 14 Nobel prize laureates studied and carried out research at the University of Würzburg. Considering the location and the historical significance of the city for scientific discovery and innovation, the chosen theme for ISL2019 is "Supply Chain Networks vs Platforms: Innovations, Challenges and Opportunities". The 24th ISL aims to provide a forum for both academics and practitioners to discuss the current and future research in the area of logistics and supply chain management. The papers in this book proceedings represent the latest in academic thinking, as well as case examples of successful implementations. The 24th ISL, also presents an opportunity to engage in various discussions and debates during the course of the event and see how our models, concepts and findings are pushing the frontiers of knowledge in the area of logistics and supply chain. Equally, it is important to explore how our cumulative know-how in our discipline can be successfully applied to develop the next generation of experts through our teaching and curriculum development as well as helping the practitioner community to enhance the competitiveness of industry.

For us as event organisers, it is especially gratifying to see that this year's symposium will once again be a truly international event, having attracted submissions from across the globe. This, together with the healthy balance of participants who have contributed regularly to the symposium over the years, combined with many first time participants who inject new ideas and points of view into the community, promises to make the event an enjoyable and valuable experience.

A particular strength of the ISL community is the enthusiasm of the participants. As the number of parallel sessions during the programme is kept low, many participants value the personal touch and community feeling that this engenders. Having the opportunity to receive personal feedback during the formal sessions, coupled with discussions and debates at the many informal setting that the symposium offers, invariably results in a memorable experience.

As in previous years, all abstracts and/or full papers were reviewed by two or more academic experts from the field of Logistics and Supply Chain Management. This book of proceedings containing the accepted papers, has been organised according the following categories:

- General issues in supply chain management
- Applications of ICT in supply chains
- Transport and distribution
- Food and cold chain supply chain management
- Inventory and warehousing
- Supply chain performance assessment
- Complexity, risk and uncertainty
- Sustainability in logistics and supply chains

To date ISL has been held in Europe, Africa, Australasia and Asia (see full list below). Following last year's successful event in the exotic and breath taking settings of Bali, Indonesia, we are very much looking forward to meeting you all at this year's symposium in historic and beautiful Würzburg, Germany.

Last but not least we would like to take this opportunity to express our sincere thanks to all the presenters, delegates, reviewers, Advisory Committee members, organising team, invited guest speakers, sponsors, partner International Journal of Logistics Management's editor Professor Britta Gammelgaard and local organising team for their excellent and valuable contributions. Finally, our special thanks go to Mrs Maeve Rhode, and Jimo Ajeseun for their support throughout the event, as well as Mengfeng Gong for her help in preparing the proceedings.

Professor Kulwant S Pawar, Dr Andrew Potter, Professor Helen Rogers and Professor Christoph Glock – July 2019.

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AN OPERATIONS-DRIVEN SIMULATION PLATFORM FOR THE ASSESSMENT OF FAIR SUPPLY CHAIN COSTS AND IMPACTS

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Purpose
Modern supply chains are characterized by large distribution networks spread over a globalized geography, multiple actors and stages, and lots of logistic operations, e.g. consolidation, packing and re-packing, storage, handling, delivery, typically performed by an extremely fractionated sector of carriers and logistic providers. In light of this, the real and objective full cost of a product which is sensibly affected by such operations is hard to be quantified.

This paper illustrates a simulation platform able to virtualize the supply chain operations of a generic logistic network and to allow quantifying costs and impacts associate to the logistic processes, thereby aiding a better and more fair product costing.

Design/methodology/approach
A flexible multithread simulation platform is developed with the attempt to virtualize a generic supply chain network as a group of production, storage and distribution nodes and to replicate the logistic operations i.e. processing, manufacturing, packing, storage, delivery throughout it. The costs and environmental impacts are then punctually quantified for each load of product (e.g. a piece, a carton or a pallet) as a consequence of the experienced processes (e.g. queues, delays and bottlenecks) and depending on the simulated order profiles, logistic capacities and the undertaken decisional levers.

Findings
It comes out that even though each load experiences the same supply chain stages, the combination of exogenous conditions (weather, traffic, season), and

endogenous aspects (congestions, bottlenecks) influences the logistic operations in a way that costs and impacts of the same product may result different.

Value
This paper explores the impact of the exogenous and endogenous conditions of supply chains on the economic and environmental performance of the logistic operations and on the determination of the proper and fair cost of a product.

Research limitations/implications
This research and the proposed operations-driven simulation platform pave the way for the implementation on real-scale of quantitative supply chain investigating approaches trough advanced digital and information technologies as Internet-of-Things and Block chain architectures.

Practical Contribution
The determination of the proper, punctual and fair cost of a product as a consequence of the experienced specific logistic operations, with better visibility and transparency about price-making for the consumers and all the involved supply chain actors.

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IMPLEMENTATION CHALLENGES OF THREE-DIMENSIONAL PRINTING (3DP) IN MEDICAL DEVICE MANUFACTURING SUPPLY CHAINS

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Purpose
The aim of the study is to investigate the implementation challenges of 3DP and explore the level of difficulties in overcoming these challenges.

Design/methodology/approach
We develop a conceptual model by employing the technology-organisation-environment-cost (TOEC) based framework of technology adaptation (Yeh and Chen, 2018; Baker, 2012, Tornatzky and Fleischer 1990). To identify and prioritise the implication challenges of 3DP manufacturing, we conduct case study interviews with 3DP experts. The participants of this research are senior executives of 3DP product firms, and 3DP research and development experts.

Findings
Analysis reveals that the critical implementation challenge categories are predominantly technology (production), business environment, and cost related. The major challenges are related to quality of products in terms of surface finish, standard, strength and colour. Furthermore, requirement of new skills in designing the products and cost of raw materials are found to be major challenges.

Value
This research contributes to both manufacturing management and advanced manufacturing literature. Through literature review this study develops a framework to conceptualise implementation challenges of 3DP manufacturing.

Practical Contribution
This research will help guide firms using 3DP for manufacturing to identify challenges in implementing 3DP.
Research Limitations: This study is conducted from the one manufacturer's and two research and development organisation perspective. Therefore, further investigation is necessary for other manufacturer involved with 3DP

THE IMPACT OF ADOPTING ADDITIVE MANUFACTURING ON THE PERFORMANCE OF A RESPONSIVE SUPPLY CHAIN

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PurposeMatching supply with demand is the primary concern of supply chain management. Uncertainty in demand, however, is detrimental to performance as it leads to cost in the form of backorders, low capacity utilisation and avoidable inventory. This paper investigates the value of adopting Additive Manufacturing (AM) technology for the performance, and flexibility as a performance-related metric, of a supply chain with uncertain demand, taking into consideration the cost of inventory and backorders.

Design/methodology/approach This paper implements an inter-process comparison by simulating a supply chain based on data collected from a plastic products manufacturing company that produces pipe fittings using injection moulding technology. The used dataset was combined from company information and AM specific data form the University of Nottingham. The investigated simulation model is built for both scenarios, with AM and with injection moulding, using the Arena software package.

FindingsBy incorporating the cost of inventory and backorders, injection moulding still showed lower unit cost compared to AM. While AM exhibited higher levels of supply chain flexibility both in mix and new product introduction, injection moulding presented higher volume and delivery flexibility.

ValueThis paper addresses a gap in current knowledge by systematically examining the value of employing AM in mass manufacturing environments with uncertain demand. These findings will shed light on the broader benefits of AM adoption by investigating its impact in a wider supply chain context

CASE STUDY BASED MULTI-PARAMETER OPTIMIZATION AND SIMPLIFICATION OF EOQ MODEL TO REDUCE THE NEED FOR DATA

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Purpose
As most models focus on a specific question (Alard et al., 2014), the effect of multi-parameter optimization is surveyed in the presented paper. To overcome the often cited data availability problem, when implementing Total Landed Costs (TLC) or Total Costs of Ownership (TCO) models, the paper surveys the capability of simplified models, which need much less data.

Design/methodology/approach
Multi-parameter optimization is applied in a real-world case study in industrial goods industry. The model is derived by an eight-step approach, which is proposed by Ellram (1993) and which was already applied by Bremen (2010) for deriving TCO models. The reduction of needed data is done by Linear Regression, whereas the results are validated by a Monte-Carlo-Simulation.

Findings
The paper shows, that multiple parameter optimization exceeds results of classic EOQ models many times over, showing also the effect of different optimization parameters on cost categories. Furthermore, simplified, models enable a deviation of minimum total costs, of below 5%.

Value
This paper (1) shows the effect of multi-parameter optimization by an Economic Order Quantity (EOQ) model, allocating the effects per optimi-zation parameter to cost categories. Furthermore, (2) the by linear regression derived simplified models show relatively good accuracy, reducing the number of independent variables considerably. Therefore, the results support purchasing and supply chain managers in inbound logistics optimization to increase cost reductions by models capable of multi-parameter optimization and helps to overcome one of the most often cited data availability problem.

Research limitations/implications
In order to show models, which enable process parameterization, it is recommended to intensify research on the topic of multi-parameter optimization as well as on the accuracy of models in case of reduced data availability.

Practical Contribution
The paper suggests to derive similar models by an eight-step-approach, which was originally proposed by Ellram (1993) for TCO models. These models have to be capable to answer multiple questions. Optimization parameters have to be chosen based on the cost categories and their share in the as-is-situation. In case of a data availability problem, the paper suggests to derive easier models by Linear Regression

THE ROLE OF ORGANIZATIONAL META-KNOWLEDGE FOR CYBER-PHYSICAL SOCIAL SYSTEMS IN INDUSTRY 4.0

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Purpose
One of the central ideas of Industry 4.0 is to increase flexibility. This involves collaboration of artificial decision-makers (intelligent agents) and human workers in cyber-physical social systems (CPSS). Information systems supporting those work processes must become cyber production management systems to provide knowledge for socio-digital coordination.
Knowledge includes capabilities for accomplishing tasks and an overview of the process and organization structure (knowing who knows what). The latter is known as organizational meta-knowledge which is crucial for coordinating distributed work involving multiple parties with different capabilities. We identify the necessity of meta-knowledge in CPSS from an interdisciplinary perspective of business informatics and organizational psychology. This paper reviews research on work process planning according to where meta-knowledge is generated or needed to facilitate developing new assistance technologies for CPSS.

Design/methodology/approach
Conventional production achieves process performance through division of labor by specialization. Manufacturing lines coordinate teams of specialized workers in repetitive processes. However, Industry 4.0 introduces flexibility to increase efficiency (throughput maximization, cost and effort minimization) and reliability (robustness against failure). From an organizational psychology perspective, specialized teams only work efficiently if they have common meta-knowledge. Flexibility changes the required meta-knowledge as roles become re-assigned and task-related knowledge becomes re-located. Thus, it is crucial to provide teams with up-to-date meta-knowledge about process and role organization.

Findings
Three major planning and scheduling procedures affect knowledge. Given a workforce, qualification management(1) provides workers with the capabilities to perform required tasks. It includes hiring staff, buying machinery, training employees, or providing assisting technology to guide workers through unfamiliar tasks. In CPSS, capabilities should also include knowledge about how to interact in teams including artificial agents.
Knowledge requirements result from shift planning(2) which assembles teams that cover a set of roles with the required team members' capabilities. Since cooperation requires meta-knowledge about capabilities of others to ensure process efficiency/reliability, shift planning in CPSS must account for and provide that meta-knowledge.
The resulting team compositions constrain the optimal scheduling of jobs(3) to teams of workers with given capabilities. In CPSS, meta-knowledge must be

provided to human and artificial decision-makers and updated in the case of role changes and re-scheduling of tasks to maintain robustness against failures.

Value
The human perspective in socio-digital teams is currently underrated in optimization, planning, simulation, and information systems design. We point out where to extend research and technology based on psychological findings to develop insights and tools for knowledge management in CPSS for researchers and practitioners.

Practical Contribution
Assistance systems providing task-related knowledge must be extended with team coordination functionalities including meta-knowledge. Human-agent-interactions with those systems must be evaluated in experiments, simulations, and field tests

PARTICIPATORY DIGITAL TRANSFORMATION: HAPTIC ACCEPTANCE CATALYST FOR THE EMPLOYEE-CENTERED DESIGN OF CHANGE PROCESSES

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Purpose

The successful digital transformation requires employees to be sensitized to innovations and to take them along on the path of organizational change. New technologies can only develop their full potential if the employees, as process experts and essential interfaces, are integrated into the design of the digitized processes. According to an empirical study by ZIEMENDORF, the causes of resistance are less to be found in rational decisions than in emotional aspects of "fear", "shyness", "helplessness", "inertia", "anger" and "power", which are increasingly attributable to insufficient participation of people in processes of change (cf. ZIEMENDORFF 2009). The digital transformation therefore needs an integrated management that considers technological and IT process innovations in equal measure, as well as the changing role of employees and the associated development of the entire organisation. (HENKE et al. 2018)

Design/methodology/approach

The paper presents the approach of designing a discussion space with a haptic demonstrator as the core, as an acceptance catalyst for change processes in the company. The demonstrator pursues the approach of creating a haptic interface between the digital and analog world on the one hand and between employees and planned future work processes and objects on the other.

The demonstrator concept "haptical" was already developed in the science year 2018 for science communication and showed first successes in stimulating constructive discussions based on an example of intralogistics. In this example, the information flows between the autonomous machines in the Internet of Things, which will shape the working world of the future, were visualized via intelligent objects that determine their position in space, via corresponding projections in the environment of the real objects in a virtual environment. The research approach is to transfer this concept to the participation processes in corporate transformations.

Findings

First application scenarios of the demonstrator have shown that this interactive way of presenting future scenarios for working environments promotes the active critical examination of this scenario and stimulates constructive and creative suggestions as a transfer of the experience knowledge of the employee to the future situation.

Technology integration scenarios are often supported by laboratory environments in which the technology is usually made available to employees for the purpose of learning to try it out. In digital transformation, which is

characterised by changes in the provision of information, work processes and interaction with automated or even autonomous machines, such processes have so far not been modelled in a way that can be touched and experienced. The depiction in virtual spaces is slowly gaining relevance in practice, but here the discursive contribution of a group is already technically excluded. The WING project (BOES et al. 2017) shows first results which show the keys for an acceptance-promoting effect of innovation spaces as a physical realization of the participation possibilities of the employees in transformation processes.

Value
The paper presents the technical possibilities of the demonstrator concept and explains the scenario already realized. The question to what extent the already indicated experience gained with comparable approaches from VR and technology-focused laboratory environments can be transferred is discussed and possible application scenarios described.

Research limitations/implications
In future case studies with companies, the aim will be to prove the acceptance catalysing effects. As a practical implication, however, the positive effect of internal discussion and laboratory environments in transformation processes on the acceptance by employees and their active participation can already be derived from this state of the investigations.

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A RESPONSIBLE BUSINESS LOGISTICS SYSTEMS DESIGN METHODOLOGY

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PurposeThe paper describes a methodology for responsible business logistics systems design that aims to encourage the construction of responsible and efficient logistics systems that fully integrate the business, environmental and social requirements of the system. It also indicates how it relates operational design to wider logistic and environmental issues such as globalisation, choosing logistics system structures and investigating environmental and social problems.

Design/methodology/approach The development of the methodology starts with examining a range of diagrammatic representations. The first diagram outlines some external influences and interfaces to operational logistics decisions. The influences include factors such as the objectives of the organisation, together with the business, economic, environmental, legal and political constraints including the logistics planning requirements. A second diagram looks at strategic and structural influences, including Corporate Social Responsibility (CSR), environmental concerns (again) and the desired system performance, and how these interact with the operational activities of the logistics system. The paper examines and links the operational activities to external influences to produce a logistics context. This context is then used to guide the authors to develop the methodology that is presented diagrammatically. The work also uses systems approaches that include some standard SA approaches and selected techniques from some of the authors' previous papers. The paper outlines and then details the steps in the methodology. It also illustrates how to use the methodology.

FindingsThe paper identifies knowledge gaps that help in the development of the design methodology because they focus the attention of designers on potential problem areas and improve understanding of these problems. The paper illustrates how the methodology relates to wider logistics and environmental issues such as globalisation, logistics system (LS) structures and the economic, environmental and social problems that designing and using logistics systems raise. Some of the potential strengths of the developed methodology are: (1) representation is generalised and there is no restriction on the number of logistics modules, (2) an iterative design process that encourages an open-ended look at design possibilities, (3) allows flexibility in choosing weights for environmental, social, and traditional design investigations, and (4) encourages the simultaneous use of top down and bottom up performance measures.

ValueThis paper is part of an ongoing responsible logistics project that has been examining the environmental implications of the inventory, manufacturing and

logistics systems functions, making it, therefore, a natural progression. It is, to the authors' knowledge, the first study to present a methodology designed to offer designers of business logistics systems a flexible structure, specifically to iteratively produce logistics systems that are economically, environmentally and socially excellent. An important attribute of the methodology is to use a proposed iterative sequence of steps which help to define the system's attributes. The iterative nature of the process means that the designer can steadily improve the proposal and the methodology's flexibility allows the designers to adopt priorities that they think are appropriate for the situation

ELECTROMOBILITY AND DIGITALIZATION: DO AUTOMOTIVE SUPPLY NETWORKS ADAPT IN REVOLUTIONARY OR EVOLUTIONARY PATTERNS?

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Purpose
Two major trends, electric mobility and digitalization, are going to transform the automotive industry. Car manufacturers and suppliers alike are under increasing pressure to adapt to these trends. This paper shows how German car manufacturers and their suppliers assess electric mobility and digitalization in terms of supply network adaptability. It is discussed if these trends follow evolutionary or revolutionary patterns.

Design/methodology/approach
Adaptation can be seen as a process of evolution – in natural ecosystems as well as in supply networks. Evolutionary Economics and Punctuated Equilibrium are combined into a theory framework to analyze the adaptation processes of German automotive supply networks. Data has been collected in four in-depth interviews with managers of German car manufacturers and tier-1 automotive suppliers, respectively.

Findings
Both car manufacturers and automotive suppliers see electric mobility as a trend that is still in an equilibrium and can be dealt with slower, gradual modes of adaptation. However, some experts have the opinion that this will only work until a tipping point is reached. In contrast, the impact of digitalization on automotive supply networks is much less clear. While some experts see a distinct revolutionary impact on the supply networks which requires an abrupt adaptation to new scenarios, others follow a more conservative view assuming a longer time allowance for supply networks to adapt gradually. The data suggests that the former have a focus on the connected car/autonomous driving, while the latter are following a more general approach that also includes "smartphone-on-wheels" concepts. Irrespective of the impact on a company's products, digitalization changes the way a company works internally and collaborates with both its supply network and its customers. Both car manufacturers and tier-1 suppliers agree that the supply networks enjoy long phases of relative stability. Trends requiring a rapid, fundamental adaptation are rare. This suggests that the theory framework that combines Punctuated Equilibrium and Evolutionary Economics is a promising toolset for analyzing the adaptation of supply networks.

Value
This paper presents empirical insight from the automotive industry on how car manufacturers and tier-1 suppliers prepare to cope with the trends of electric mobility and digitalization. To the best of our knowledge, this paper is the first

attempt to combine Punctuated Equilibrium and Evolutionary Economics into a conceptual model for the adaptation of supply networks as a response to fundamental changes.

Research limitations/implications
It needs more empirical data, from case studies for instance, to develop a more detailed conceptual model of how supply networks adapt to long-term, fundamental changes

ENHANCING CUSTOMER SERVICE THROUGH FOCUSED SUPPLY CHAIN RISK MANAGEMENT AND PERFORMANCE METRICS

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Purpose
The southern African mining industry has faced many trials in recent times, with decreasing profit margins due to declining commodity prices and increases in critical cost drivers. Given demand and supply issues such as remote mining sites, sporadic demand, limited storage capacity at the mines and regulations that limit the delivery of explosives, this study seeks to determine the impact of the explosives supply chain's performance in servicing mining customers and to describe how explosives suppliers can use the information to improve their competitive position. Thus the study assessed the effects of reduction of supply chain risk elements to increase supply chain performance to improve the customer service experience.

Design/methodology/approach
A case study was used as this research explored a phenomenon that few have considered before. Interviews were conducted with production personnel, supply chain personnel, sales representatives and customers to determine perspectives on production, operations, supply chain and demand risk in the supply chain. This highlighted various angles of the explosives chain. Sources of supply chain risk and uncertainty, supply chain performance and theories on customer service delivery were used as themes during interviews to determine how the elements affect practices in the explosives supply chain and ultimately the customer experience. Interviews were used to determine the greatest issues and draw conclusions on how supply chain elements affect supply chain performance.

Findings
This research developed a model which links risk identification directly to supply chain performance and customer service levels. The model was tested within a highly regulated environment to identify specific risks to the explosives supply chain. Risk management through performance metrics was directly linked to improved customer service levels. The model was found to be versatile and adaptable to supply chains in general.

Value
While various studies explore supply chain risk, supply chain performance and customer service in isolation, this research aimed at creating a framework which links these to illustrate the cause and effect relationship of risk to supply chain

performance. This model can be replicated across industries, and is not limited to explosives supply chains.

Research limitations/implications
The model developed through the literature review is applied in a single case and results are thus not generalizable other industries in other environments.

Practical Contribution
The model, developed from the literature, highlights key supply chain risk areas that are directly linked to the most important customer service attributes. The identification of these specific risks, which can be measured and therefore managed, are directly related to supply chain performance, which ultimately aims at improving customer service levels

DISTRIBUTION COMPLEXITY AND ITS IMPACT ON PERFORMANCE: A CASE STUDY

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Purpose
Drivers of distribution complexity can be variety of products that needs to be delivered, the uncertainty in demand, the number and geographical spread of customers (Gerschberger et al., 2012; Wu et al., 2013). There is limited research on quantifying the complexity in distribution and to assess the impact of such complexity on the performance. Hence, the purpose of this paper is to answer the following research questions
1. How to estimate the distribution complexity in an industrial gas distribution company
2. How does complexity impact the performance of the company?

Design/methodology/approach
Data on the number of customers, number of products, silo size, daily demand and standard deviation of demand were collected along with performance measures like distribution cost and number of close to stock-out situations (NCSO) from the case company. These were supplemented by interviews with people from the case company for understanding the current state of operation, the degree of information sharing between the company and its customers, and for confirmation of the findings. The collected data were used to create the complexity index by considering weights of the individual factors using Analytical Hierarchy process (AHP). Statistical analysis was then conducted to understand the impact of the complexity on the performance measures.

Findings
The results showed that performance measures showed no significant difference for different complexity levels. However, a change in the weight of the standard deviation of demand a little resulted in a significant difference on performance between low and high complexity levels. Considering the individual factors of complexity, cost performance were significantly affected by standard deviation of demand while the number of close to stock-outs was significantly affected by both the silo size of the customer and standard deviation of demand.

Value
Creation of a distribution complexity index and assessment of impact of complexity index and individual drivers of complexity on distribution performance are the contributions of this paper.

Research limitations/implications
The research is based on data from a single company and hence the results cannot be generalised. The research implies that there is a need of better

understanding of various factors that drive complexity but also their impact on performance.

Practical Contribution
Companies are usually unaware of the negative effects of complexity and their costs increase as well as their ability to service customers suffers. Hence, companies should proactively analyse the impact of complexity on performance and potentially assess the cost of additional complexity on business performance so that corrective actions can be taken to either reduce complexity or make improvements in the supply chain to handle complexity.

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OPTIMAL RESOURCE ALLOCATIONS AND PRICES NEGOTIATIONS IN COLD CHAIN CHANNELS

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Purpose
This study aims to assist brand marketers determining the optimal prices and corresponding quantity allocated for channel operators before annual sales, while considering the stochastic demand patterns and the inter-dependency among the brand marketer and channel partners.

Design/methodology/approach
We first start from modeling behaviors between one brand marketer versus one channel partner. Moreover, for those one-to-many bargaining conditions, we embed the optimization logic into the simulation program to analyze different channel resource allocation strategies, with different operational purposes and equity issues.

Findings
This study will focus on cold-chain product suppliers and distributors in managing channel resource allocation problems, from general sale periods to specific promotion dates.

Value
Instead of arbitrarily allocating limited resources on summer, the study tends to provide a quantitative approach to assist ice cream brand marketers determining the optimal prices and corresponding quantity. Different allocation rules will be examined in this study

SMART MOBILITY: CHALLENGING ISSUES AND NEW OPPORTUNITIES IN A SUSTAINABLE SMART CITIES

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Purpose
The self-driving technology brings to the development of smart city new opportunities and positive impacts, at the same time new challenging issue like negative social effects such as distance among social status of the people, moral and ethical issues, job loss or human behaviour make process of general adoption of autonomous vehicles (AVs). The paper addresses these critical issues and has an aim to provide the insights into a new mobility level that can contribute to a more sustainable city change.

Design/methodology/approach
The methodology includes a systematic review of the existing literature to understand capability and impact of the challenging issues associated with autonomous vehicles. Special focus is to investigate their effect on sustainability by the PESTEL analysis in the framework of the smart city.

Findings
This paper provides a PESTEL analysis for political, economic, social, technological, ecological and legal domains of the city environment in order to identify the most challenging barriers and advantages for the adoption of the autonomous vehicles in the smart city environment. The analysis takes into consideration public acceptance and cooperation aspects.

Value
The most important barriers for the effective adoption of the AVs have been identified on the macro-level of decision-makers, i.e. global standards for AVs, job market changes, waste management, effective resources and energy utilization. From another side there are a number of positive effects that can be realized from the adoption of AVs, in particular in greater flexibility and mobility for all members of the society. However, the speed of AVs technology

implementation depends on and is strongly determined by the existing level of acceptance for the smart mobility concepts in the society.

Research limitations/implications
The finalised results of this research are not reached at this moment, but the preliminary outcomes show the potential of the topic and will be used as a fundament for the further investigations.

Practical Contribution
The results of this research have a conceptual nature.

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A SYSTEMATIC REVIEW OF FOOD LOSS AND WASTE FOR THE CIRCULAR ECONOMY

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Purpose
Food loss and food waste (FLW) have become a top priority in global and local political agenda. For example, the UN Sustainable Development Goal (SDG) Target 12.3 aims to half the per capita global food waste at the retail and consumer levels, and reduce food losses along production and supply chains, including post-harvest losses. Food loss is due to a decrease in availability and quality of food that is intended for human consumption. Food wasted on the other hand refers to discarded food that was fit for human consumption. The latter happens more at the end of the supply chain at retailers and customers. Applying circular economy concepts to the food supply chain would target and turn food loss and waste into value added products. While there are many papers looking at food loss and waste in the supply chain, the research on recirculating food loss and waste is relatively new. A quick literature search reveals only 103 papers published since 2014 with the large majority in published during the last three years. The purpose of this paper is to first give an overview of the literature in FLW and to provide a systematic review of the

research on circularity in the food supply chain. This is an important topic for food security and safety and it will provide avenues of for new research.

Design/methodology/approach
A systematic literature review of over 400 articles has been conducted on FLW and circularity based on descriptive, thematic and content analysis relevant to the food supply chain.

Findings
The article provides a framework for classification of the literature review. In addition, based on the literature review the paper brings out the Sustainability issues in globally connected logistics and food supply chains.

Value
A first review of the circular food economy.

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ANALYSIS OF FOOD LOSSES AND WASTES IN PERISHABLE FOOD SUPPLY CHAIN IN HO CHI MINH CITY

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Purpose Thousands of tons of perishable foods are transported and traded into three agri-food wholesale markets in Ho Chi Minh City on the daily basis, which is estimated to generate at least 240 tons of food wastes, costing the government more than £2000 per day to handle the wastes. The amount of foods flooding into Ho Chi Minh city is in an upward trend, which pose more pressure on municipals to find solutions for waste treatment. A high proportion of food waste does not only impact negatively on the well-being of the neighbourhood and environment, particularly water source, but also reflects an inefficiency in the operation of the supply chain. The situation eventually leads to higher prices of perishable foods that are borne by consumers. Therefore, the purpose of the paper is to systematically identify, measure and lower Food Loss and Waste (FLW) in critical steps of multi-echelon supply chain for perishable foods, mainly vegetables, in three wholesale markets in Ho Chi Minh city.

Design/methodology/approach The paper uses the Food Integration Reference Model (FIRM) to not only to identify, quantify and reduce food losses and wastes, but also establish the connections with nutrient retention in the supply chains of perishable products.
Research scope: The research's scope focuses on primary production, harvesting, transportation, processing from the farm to the agri-food wholesale points in Ho Chi Minh city. In the future, the research is expected to extend to cover the downstream stage of the supply chain with retailers and consumption point.

Findings The research firstly mapped out the supply chain flows and identified food loss and waste from production stages, transportation to three wholesale points in Ho Chi Minh city. The result reveals the main types of food loss due to deterioration/spoilage which occurs due to improper processing and understanding of the cold chain at the collection points and wholesale points, inappropriate packages and sortation during transportation.

Value The paper proposed a novel approach to integrate different phases of food supply chain and illustrates the application of the FIRM methodology in addressing FLW issues in perishable food supply chain.

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SUPPLY CHAIN TRACEABILITY AND BLOCKCHAIN - ISSUES AND CHALLENGES

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Purpose
Blockchain technology is viewed by many businesses as the main technological innovation borne out of a wave of digital crypto-currencies. It is currently believed that this new technology has the potential to improve efficiencies, security and trust across a range of marketplaces, however as with most radical disruptive technologies, considerable 'hype' exists surrounding Blockchain declaring that it will have important Supply Chain Management applications. This paper seeks to contextualise a range of issues to assist understanding why from proof-of-concepts are difficult to scalable industry-wide applications.

Design/methodology/approach
This paper is set out in sections, namely; a systematic review of literature of blockchain publications from 2009 to date, with an extended focus on the 'traceability' to gain a cursory insight into any important emergent issues before highlighting a range of key factors to consider when developing blockchain supply chain pilots.

Findings
It is clearly evident that a myriad of research opportunities exist for blockchain applications in areas of; systems integration, technology adoption, alignment with supply chain model and frameworks, cost-to-serve and return on investment analysis, change management, authentication/certification and most importantly operational considerations.

Value
We conclude that the migration of proof-of-concept to scalable industry-wide applications will be difficult, if not impossible while the highlighted complex areas remain unaddressed

LOCATING THE REGIONAL LOGISTICS CENTRE: AN EMPIRICAL STUDY

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Purpose
The purpose of this research is to propose multi stage process to locate logistics center given independent and partially conflicting criteria. Complex multi stage ranking framework is introduced to select the most desirable location of the regional logistics centers based on multiple criteria evaluation.

Design/methodology/approach
Location selection process is conducted at two phases. The first phase of selection process is applied following macro analysis criteria to select the most appropriate cities in each region. At the second phase, specific locations within each governorate are evaluated to select the best location following micro level analysis; where specific stakeholders, objectives, descriptor and perceptive are considered.
At the macro phase, complex multi stage ranking process following three level hierarchical problem was established to rank cities in the region from the best to the worst in terms of their suitability for locating the logistics center. At the first level, distance matrix was constructed to measure the average distance between each city and other cities in the region. After excluding cities with distance longer than the average distance; production as a proxy of supply and population of each city as a proxy of demand were measured to choose cities with highest demand and supply. Finally, trade capacity for each city was considered in order to select the most appropriate cities in each region to establish regional logistics centers.

Findings
An empirical study on Egypt was conducted in order to select the best cities to locate the regional logistics centres. 27 governorates were classified in three regions (Delta region, Middle Egypt and Upper Egypt). The analysis revealed four governorates out of thirteen to serve as regional logistics centers for Delta region. Two governorates out of six can serve as regional logistics centers in Upper Egypt, while two governorates out of eight can serve as regional logistics centers in Middle Egypt.

Value
A multi stage process is introduced to locate logistics center at macro and micro levels while dealing with multi-criteria conflict. The research proposed a framework based on a set of macro criteria (distance, population, production and trade capacity) reflecting both the supply side and demand side to select the most desirable locations of the regional logistics centers.

Research limitations/implications
The paper conducted macro analysis to locate the regional logistics center at a city to serve the whole region, while further research - following the proposed

multi stage process- should focus on micro level analysis to determine the most appropriate specific location within the city to establish the logistics center.

Practical Contribution
The proposed procedure can help both investors and governments to locate the regional logistics centers taking into consideration macro-economic variables in order to increase their efficiency in terms of improving their logistics performance, increasing their sustainability and ultimately allocating fund to the most desirable location.

THEORETICAL MODEL OF SUPPLY CHAIN ACTOR ICT CAPABILITIES TO BUILD RESILIENCE A DELPHI STUDY OF EUROPEAN LOGISTICS EXPERT

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Purpose
European Commission Horizon 2020 project 'Architecture for European Logistics Information Exchange' (AEOLIX), ventures to improve visibility across supply chain networks via development of a digital platform for data management, sharing, and distribution. This paper sets out to establish the market potential of such a platform considering the opinions of academia, technical experts and industry stakeholders.

Design/methodology/approach
This research employed the Delphi technique to compose a list of issues focusing on building resilience into supply chains through collaborative visibility. Delphi methods have proven to be an efficient survey method when only a limited amount of data is available or the topic is previously unexplored. It [Delphi] further permits alternate viewpoints to elicit information and validation of opinions to arise, or alternatively, identify discrepancies which can in turn be investigated.

Findings
Preliminary research has identified the current market state to be dominated by out-of-the-box solutions, comprising at least 57% of the market stakeholders. This percentage increases when considering market share held by these stakeholders [logistics organisation] as they are typically larger adopters of out-of-the-box solutions. Therefore, any disruptive technology in this area must be demonstrably more useful and cost-effective than the currently on-market alternatives. However, in gaining collaborative end-end supply chain visibility, integration and SME adoption was found to be a critical issue stifling logistics innovation in ICT solutions. Additionally, any innovative logistics solution that permeates through academic research or SME design suffers minimal market penetration due to the 'closed source' approach of larger ICT logistics suppliers.

Value
This research paves the way in identifying effective routes to, as well as the barriers of entry, to this market via assessment of client expectations and requirements as to successful integration and use of emergent solutions to data management, sharing and distribution across supply chains.

Research limitations/implications
A potential barrier to work of this nature is ascertaining as wide of a perspective as possible in order to mitigate variations in opinion across geographic regions. By working with AEOLIX we have access to a multitude of European supply chain stakeholders across multimodal transportation requirements. This provides a diverse range of expert opinions within the Delphi allowing for the identification

of a general-case basis of requirements for emergent and disruptive technologies.

Practical Contribution
This research will drive new approaches in the design and development of logistics and supply chain solutions through the identification and provision thereof client expectations and requirements for the uptake of new technologies

THE USE OF ASSISTIVE DEVICES FOR MANUAL MATERIALS HANDLING IN WAREHOUSES: A SYSTEMATIC LITERATURE REVIEW

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Purpose
The aim of this paper is to evaluate how technical assistive devices for manual materials handling have been analysed in the literature in a ware-housing context. The focus of the review is to understand the existing scientific evidence on the impact of the assistive devices on both the economic and human factors (i.e., perceptual, cognitive and physical er-gonomics) performance of the logistics system.

Design/methodology/approach
A systematic literature review methodology was used to identify works that describe the use of assistive devices for manual materials handling in warehouses. Scientific databases (SCOPUS, Web of Science, Engineering Village, and Pubmed) that cover the research disciplines of logis-tics/production/operations management as well as human fac-tors/ergonomics were searched. Keywords were used to identify papers that 1) were in a warehouse context, 2) studied an assistive device, and 3) studied the related human factors aspects of the assist. A "snowball" search was conducted by examining the reference lists of relevant pa-pers. Relevant studies were assessed for the type of variables studied (e.g. system centric vs person centric), the tasks supported and the na-ture of the human factors "assist" being provided by the device.

Findings
The preliminary results of the review shows which types of assistive de-vices have been analysed in the literature in the past, and from which perspective these devices have been investigated. Some works adopted a human factors perspective (such works study how these systems can re-duce cumulative or peak load, for example exoskeletons), a management point of view (such works focus on a cost/performance analysis of these systems, for example augmented reality), and a combined management and human factors point of view. Works with an integrated perspective (i.e., that consider both human factors and management perspectives), however, are rare.

Value
This paper supports researchers and practitioners in giving an overview of technical assistive devices that can be used in manual materials handling and their performance measures. It further identifies research gaps in the literature

and emphasises the need to understand the interactions be-tween human and system related variables in designing effective manual material handling systems that are sustainable from the workers' and from the company's perspective.

Research limitations/implications
This paper points out a clear research gap regarding an integrated analy-sis of technical assistance systems for manual materials handling in warehouses. To ensure methodical rigor and scientific quality, we limited our sample to works that were published in peer-reviewed journals and conference proceedings, excluding books and book chapters which might have biased the sample.

Practical Contribution
The results of this paper can be used by warehouse managers to prepare the evaluation of technical assistive devices for manual materials handling from an integrated (economic and human factors) perspective.

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LINKING BLOCKCHAIN ADOPTION IN SUPPLY CHAINS TO JOB OUTCOMES, FIRMS AND INTERFIRM IMPACTS

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Purpose
Blockchain technologies are expected to bring important changes to the supply chain management (SCM) and logistics industries. This is mainly because of their high transformational capabilities. However, extant literature is limited in the availability of blockchain adoption and outcomes in the SCM. This study aims to bridge this knowledge gap, develop a research model that investigates the relationship between blockchain adoption and two organisational outcomes (job satisfaction and job performance) as well as two inter-organisational outcomes (SCM transparency and blockchain benefits).

Design/methodology/approach
We developed a research model based on the diffusion of innovations, the Technology Acceptance Model, the SCM and emerging literature on blockchain. The study was validated using data collected from 738 supply chain professionals in India and the USA. We analysed the model by means of structural equation modelling.

Findings
The findings identified major differences in behaviour in blockchain adoption, in job outcomes, and in blockchain perceived benefits in the two countries. Additionally, this study found that complexity and compatibility have a non significant effect on the behavioural intention to adopt blockchain in both countries.

Value
This study is one of the first empirical investigations on blockchain adoption in supply chain and its related benefits (e.g., job satisfaction, job performance, and supply chain benefits).

Research limitations/implications
With regards to the limitations of this study; scarcity of extant literature which impedes reliable comparison tasks, low potential for generalising our findings as more investigations are needed in other emerging and developed countries are some of the main limitations.

Practical Contribution
Our study suggests that, managers need to consider job performance and job satisfaction as mediators of blockchain adoption and perceived benefits, while integrating the differences that may arise in this regard across countries. In addition, our findings suggest that, in emerging economies like India, these relationships do not need any mediation, which implies that perceived benefits are directly predicted by blockchain adoption. Notwithstanding, in the USA,

mediation is necessary, and managers should consider these effects in their blockchain projects

REDUCING ENERGY COST IN WAREHOUSES VIA SMART LIGHTING SYSTEMS: A SIMULATION MODEL

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Purpose
Lighting influences private and working life. At the same time, it is a critical contributor to energy consumption. Although there exist manifold technical solutions for lighting to become "smart", today's lighting systems are often kept simple, and they are frequently not adjusted to the user's behaviour. This is especially the case for production and logistics facilities such as warehouses, where large areas have to be illuminated and where lighting is often fully turned on while the warehouse operates. This paper presents a simulation model that was developed to evaluate the cost benefits that may result from using smart lighting systems in warehouses. The simulation model considers different warehouse layouts, storage assignments as well as order batching policies and analyses how three alternative lighting strategies influence the cost of operating the warehouse.

Design/methodology/approach
The paper first proposes a concept for a simulation model and then implements the concept in the software Plant Simulation by Siemens PLM Software. The simulation model allows varying warehouse design and order picking process parameters, such as the length and number of aisles and cross aisles or the number of order pickers working in the warehouse at the same time. In addition, three different operating strategies for the lighting system have been implemented. A structured simulation study allows gaining insights into how smart lighting systems interact with system design and process parameters and how both, collectively, influence warehouse operating cost.

Findings
Preliminary results indicate that the two investigated smart lighting systems have a great potential to reduce energy consumption in warehouses compared to conventional lighting; the absolute savings strongly depend on the parameters of the simulation model. If the number of pickers increases in relation to the size of the considered warehouse, for example, energy savings decrease. More sophisticated lighting systems that stronger adjust lighting to the order picker's user behavior lead to higher energy savings, but may be

associated with higher investment cost. The proposed model supports evaluating these tradeoffs.

Value
This paper is the first to evaluate the cost reduction potential of smart lighting systems in a warehousing context. It evaluates different configuration levels for the lighting systems and thus supports a (gradual) shift from traditional lighting to smart lighting in warehouse practice.

Research limitations/implications
The proposed model could be extended to include further warehouse layouts and order picking strategies currently not covered in the model implementation. In addition, benefits of smart lighting systems that extend beyond reductions in energy cost, such as human centric lighting and visible light communication, need to be considered in addition to fully evaluate the potential smart lighting systems may offer in a warehousing context.

Practical Contribution
The results of the paper support companies in operating such systems, as well as when deciding on whether or not a smart lighting system should be implemented.

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GROWING UP AND MATURING: EVALUATING SME GROWTH PHASES USING THE QUICK SCAN APPROACH

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Purpose
Although there is disagreement as to the number of stages, sequencing, and progression, literature suggests that Small/Medium sized Enterprises (SMEs) go through several growth phases, each with distinct challenges (Kazanjian and Drazin, 1990). When such organisations begin to expand there is typically the need for increasing formalisation (e.g. processes, strategy, structure) (Lewis and Churchill, 1983). The Quick Scan Methodology (QSAM) assesses the performance of an organisation's supply chain and reflects on maturity related factors to suggest improvements (Childerhouse and Towill, 2011). However, QSAM has predominantly been applied to larger organisations. Hence, the purpose is to investigate the supply chain maturity and growth phases in manufacturing SMEs via the application of the QSAM.

Design/methodology/approach
A consolidated categorization of SME growth stages is established, and this is integrated with supply chain maturity and QSAM concepts. We then undertake a cross case analysis of QSAM data from three manufacturing SMEs (Naim et al., 2002). For each case, we utilized interviews, process mapping, root cause analysis, analysis of archived systems data, and vector scoring. Case 1 (ModuleCo) is a manufacturer of modular building elements (70 employees). Case 2 (LiftingCo) is a manufacturer of specialist lifting equipment (35 employees). Case 3 (TestingCo) is a producer of specialist testing equipment (120 employees).

Findings
A framework that incorporates SME growth phases and supply chain maturity concepts is developed. In doing so, it is possible to gather a more complete picture of how manufacturing SME operations and supply chain develop and mature, and what is appropriate in different phases. Growing pains identified include lead time issues, sensing customer requirements, quality control, information and communication, and establishing formalized procurement processes.

Value
The study adds to our understanding of supply chain maturity in the context of growing manufacturing SMEs. By integrating knowledge relating to growth phase models for SMEs, the QSAM is enriched and methodological advances are made,

and the understanding of supply chain maturity in the context of growing SMEs is more complete.

Research limitations/implications
Further work is needed to explore micro/larger medium sized companies, which in turn would increase the generalisability of the findings.

Practical Contribution
A set of practical guidelines are developed for manufacturing SMEs enabling them to establish their current position within the growth stages framework, the potential route forward, and general challenges that may be faced as the firm develops.

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B2B SUPPLY CHAIN PROCESSES LACKING BEHIND THE B2C DEVELOPMENTS – A CO-OPERATIVE PLATFORM APPROACH FOR JOINTLY REALIZING COMPETITIVE ADVANTAGES

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PurposeWith the presented paper, a conceptual approach for creating a co-operative and discrimination-free Business-to-Business (B2B) retail platform is demonstrated. The investigation of the approach highlights, which long term business- and market-success factors can be realized by following the Business-to-Consumer (B2C) example in terms of rapid growth due to the use of new technologies and platform solutions that meet customer expectations and needs at its best. The retail industry, mainly in the B2C market, is constantly adopting new technical solutions and digital services. The development of e-commerce solutions in this context enable the rise of new transaction types and sales channels, e.g. online-shopping platforms, that have been established successfully due to comprehensive fulfilment of end consumer needs and offering a high convenience level. In the B2B market, the usage of online tools, just as e-procurement applications and advanced supplier integration has also become a common practice over the last years. Nevertheless, in terms of adopting digital technologies that enable B2B actors to optimize processes and to gain competitive advantage is linked to certain market-specific barriers – mainly related to single actor`s capabilities and the complexity of buyer-supplier relationships. Transaction cost savings that can be derived due to close cooperation within the market would offer high potentials to reduce process complexity by additionally creating high transparency. Major players – just like Amazon - from the B2C market have already recognised the potential to enter the B2B market with their expertise and capabilities to bring new solutions to the market. It is questioned, if the B2B market should stay in the "wait-and-see" position, or to progressively counteract the loss of control that is initiated by market leading actors of the B2C retail segment.
The decisive factor in establishing an efficient, resilient and flexible platform solution is an agreement of existing B2B players on common goals and objectives by not losing control or facing risks on the other hand. Nevertheless, business relations are built on "trust", "balanced power" and "relation quality". Even if all actors involved benefit from a co-operative approach, e.g. due to know-how exchange and increasing process and transaction transparency, the development of an organizational as well as a regulatory framework is irreplaceable. Within a status quo analysis of the B2B and B2C retail market, the use of digital platforms and online services together with the identified transaction cost impacts and theories of business relations are elaborated. Based on the findings, an exemplary framework for B2B retail platform solutions is created, using the approach of the Institutional Role Model (IRM). The conceptual approach demonstrates a basic framework for efficient stakeholder cooperation in the B2B market. It allows to adopt to a constantly changing eco-

system. The investigations are limited to the presentation of a conceptual approach but pave away the further elaborations of a concrete framework construction and operation model development. with respect to new technologies. Future research should use this conceptual framework as a basis to apply it in practice. The next step is to address the identified stakeholders by presenting the approach.

PLAYFUL TRAINING FOR UNDERSTANDING ACTIVITIES, ROLES, AND STAKEHOLDER IN URBAN LOGISTICS

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Purpose

Urban logistics involves a number of different stakeholders ranging from local decision makers, community groups, customers to larger companies. Governments and local authorities pay increasing attention for improving quality of life, reducing the emissions, and ensuring high service quality to all citizens. Successful urban city logistics require holistic and systematic approaches taking all perspectives and stakeholders' requirement into account on micro, meso and macro level (Weber, 2002). This requires a good understanding of the different stakeholders of their activities and roles at different levels to develop a common understanding and foster collaboration among them (Lindholm, 2012; Gammelgaard, 2015). We propose a cooperative digital game for training potential stakeholders in urban logistics. The emphasis lies on mutual understanding of different needs and requirements and that cooperative strategy are more likely to give an optimized, holistic solution than the competitive.

Design/methodology/approach

Serious games and game-based learning has been used for various task in the domain of logistics. In our work, we focus on two aspects that are particularly relevant in urban logistics, namely collaboration, and cooperation of players with different roles, capabilities, and interests. In designing the educational game, we wanted to embed the real-world settings deep into the game mechanics and not just add gamification into a training tool. The game mechanics we used have been adapted from a cooperative board game. In contrast to other games, players have different roles with different abilities and can only win when they cooperate and understand these different roles. Our prototype translates this into logistics problems in a digital multi-user game for training. In a proof of concept, we could show in a first qualitative analysis the feasibility of this approach.

Findings

This paper shows the potential of a game-based tool for training stakeholder involved in urban logistics with an emphasis on cooperative problem-solving.

Value

The visualization of the interaction and mutual influence on the decision-making process are difficult to visualize, therefore many problems in logistics have been

simulated as optimization problems, where the different participants can individually follow their optimization strategy. Our setup focuses on logistics problems that require the cooperation of different stakeholders who have different roles and provides an environment in which the participants can experience the dependencies and cooperatively develop suitable solutions to meet the needs of the different stakeholders.

Research limitations/implications
So far, our game prototype is still limited to simple logistics scenarios with a maximum of two players in different roles. We plan to extend the system into a flexible platform that can easily be adapted to a broader range of logistics applications

COLD CHAIN OPERATIONAL STANDARDS AND A CERTIFICATION CASE STUDY IN TAIWAN

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PurposeThis paper shows an experimental project on cold chain operations evaluation and certification to the parcel service delivery in Taiwan. Three major cold chain service providers participated in the project.

Design/methodology/approach We develop a field auditing process and a scoring scheme comprising nine categories: facility, refrigerated storage and/or vehicles, refrigerating systems, temperature control, IT applications, process control, emergency plans, customer service, and human resource development is proposed to perform the evaluation of cold parcel delivery service provider. Each category is further classified into several features with individual weights. A rubrics guideline for scoring is also provided for the features.

FindingsThis study obtains many suggestions by panel members and the responses from parcel service providers. We classify them into what performed well and what should be improved as well as the challenges faced by the service providers. At the end, we further discuss the development of the first international cold chain standard bsi (British Standards Institution) PAS 1018:2017 and its linkage to ISO 23412.
Originality/
ValueDespite the importance both in academia and industry, not many studies address cold chain standards and the evaluation system that are considered as factors and systems affecting the service quality of cold chain service providers. This study presents recent development of cold chain operational standards in Taiwan and an experimental project on evaluation and certification. The findings further provide the pros and cons of results as well as the development of ISO 23412 from PAS 1018:2017

LSP SELECTION IN THE CONTEXT OF PHYSICAL INTERNET: A COMPREHENSIVE ANALYSIS OF THE LITERATURE

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Purpose
The purpose of this paper is to analyze existed multicriteria, which were published in the literatures that are relative to the selection of LSPs under the context of Physical Internet (PI) (Montreuil, 2011). And then, a decision structure of multicriteria selection is proposed. Based on this part of work, it can be explored what are the impacts of considering sustainable development on the LSPs' selection process. So that, a general comprehensive synthesis of multicriteria is built, and the interconnection and the weight of criteria utilization are investigated with regard to Porter's value chain model (1985) including the SDIs at the same time.

Design/methodology/approach
The study starts with a comprehensive literature review. A syntheses table of multicriteria accordingly is established. Under Porter's (1985) value chain model and its expansionary proposal (Gereffi et al., 2001) a value chain model with supplement of sustainable development elements and advantages was proposed. Thereby, with the help of multicriteria analysis process, to what extant the sustainable development indicators along with the classical indicators contribute to the selection of LSPs is scoped in this paper.

Findings
Firstly, a comprehensive presentation of 50 criteria will be presented according to Porter's value chain blocks. Then, 120 SDIs that are corresponding to "support" activities were identified from a graphical representation of 790 indicators, which are more than 60 SDIs corresponding to "primary" activities. While considering all the SDIs, those contain the most, in which 60 SDIs are corresponding to the "firm infrastructure" activities, 45 SDIs to "procurement" activities and 40 SDIs to "operation" activities. Finally, this work allows to present a summary of comprehensive selecting list of indicators that can be used to evaluate the LSPs decision-making process with or without SD conditions.

Value
Following a series of analysis, a multicriteria decision structure was proposed. Indeed, as there are few publications that really give a comprehensive list of indicators including SD, the paper gives a contribution to this part of work and identifies what are the most considerable aspects during the decision process. Moreover, it can be found to what extent the SD elements are taken into

account. Finally, this work is the foundation of our future testing work especially in case of exchanges between France and China.

Research limitations/implications
The paper gives a report of multicriteria selecting list, within which includes the SD items. But this list should be ameliorated in the future along with the incessant perception of the SD elements.

Practical Contribution
With the multicriteria decision-making suggestion including the SDIs of LSPs, enterprise becomes clear about what the most important evaluating indicators are. It also contributes to harmonize the conception of SD with the development of LSPs.

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A MANUFACTURER-REMANUFACTURER–MULTIRETAILER SYSTEM WITH EMISSIONS, ENERGY, AND SCRAP

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PurposeThis paper revisits and modifies the work of Bazan et al. (Comput. Ind. Eng., vol. 88, pp. 307-316, 2015) by considering a more realistic network that includes N-retailer with an integrated inventory system and scrap. It assumes that used items are collected by each retailer and then are shipped to the manufacturer (or a third party) for inspection and later remanufacturing. Here, a portion of the returned used items is remanufactured to as-good-as-new with the rest disposed of into the environment in an ecological manner.

Design/methodology/approachA new model is developed based on the integrated model proposed by Bazan et al. (2015) by adding a policy for scraping manufacturing and remanufacturing items. In addition to inventory-related costs, GHG emissions, and energy costs, it accounts for a unit costs to dispose of scrap and transport items from the provider to the retailers. Numerical examples are provided with the results discussed. The behaviour of the developed model was also investigated for varying values of parameters to stress the importance of accounting for retailer costs and a portion of defective items.

FindingsA higher portion of defective items in production increases the supply chain total cost, including energy, and the number of times to remanufactured an item. The results show there is an optimal portion of defective that minimizes the sum of GHG emissions, and that it should be higher than that of collected items. It is essential that the disposal of collected items is kept to a minimum as the remanufacturing process becomes nonviable.

ValueThis paper emphasises that product design is key in improving the quality of newly produced and subsequently collected used items, which minimizes the amount scrapped in both processes. Of course, companies should also strike a balance between environmental concerns and supply chains. This paper contributes in the direction that an economically sustainable supply chain could also be so environmentally

LOGISTICS AND THE FUTURE: FROM DEMATERIALISATION TO DEGROWTH

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Purpose
The purpose of the paper is to do an extensive literature survey of the current trends that are driving macrologistics with a special focus on dematerialisation in the context of the fourth industrial revolution and how this can facilitate a shift towards more sustainable logistics. We hope that this narrative can serve as an invitation to further debate and research on the future role of logistics in sustainability on national and global scales.

Design/methodology/approach
The literature review is conducted using a desktop research methodology with Google Scholar as the main literature source. The nature of the research outputs is qualitative and exploratory in order to enable the development of a discussion document to serve as basis for further debate and research around the topics of logistics and future sustainability on national and global scales.

Findings
The concept of sustainability regained prominence with the 1987 Brundtland report prepared for the United Nations. Towards the turn of the 21st century the concept of economic dematerialisation came to the fore again, underscoring the anticipated inability of the earth to sustain the material needs of the exponentially-increasing population. Significant technological innovations have made the concept of dematerialisation more achievable. The anticipated economic impact of this is labelled the fourth industrial revolution which naturally heralds a similar revolution in logistics for dematerialising its resource requirements and use. In order to realise the potential benefits of this revolution in a triple bottom-line sense a fourth pillar of sustainability is called for. This refers to a cultural revolution, which can already be seen on some grassroots levels, where demand itself is reduced, we truly get by with less and that which we get by with is sourced, moved, consumed and circularised equitably and sustainably.

Value
Logistics has started to make a major shift towards sustainability, but little work exists on how to prepare for logistics' role in becoming an enabler of

sustainability on national and global scales. In order to prepare a new generation of logisticians we need to begin this discussion

AN EMPIRICAL ANALYSIS ON PRODUCTIVITY IMPROVEMENT FACTORS OF JAPANESE TRUCKING COMPANIES

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Purpose

In Japan where the rapid aging of the population continues because of the sharp decline in the birth rate, labour shortage has become an important issue. The driver shortage in the trucking industry is one of the most serious problem among all industries. The labour productivity of trucking industry is significantly lower than that of other industries. The government has implemented various measures with an aim of raising the labour productivity of the trucking industry by 20% from fiscal 2013 by fiscal 2020.

Kurokawa et. al. (2018) collected productivity data on a company level, designed a questionnaire to investigate factors affecting productivity, and analysed the relationship between them.

The purpose of this paper is to develop a questionnaire survey, perform factor analysis to extract factors that affect productivity, and consider measures to improve productivity. The questionnaire survey was conducted to grasp the explanatory factors of productivity. Utilizing commercial database that includes financial information, we created a data set linked with the questionnaire. By factor analysis using this data set, major factors are extracted and the influence on productivity is analysed.

Design/methodology/approach

The questionnaire survey was conducted to grasp the explanatory factors of productivity. Based on previous research and preliminary interviews, we designed the 35 survey items such as characteristics, business environment, activities, and strategy. The mail survey was conducted during February 24th to March 15th, 2018. The number of mailings was 1,995 and the number of respondents was 489 (24.5%). Utilizing database that included financial information, we created a data set linked with the questionnaire. By factor analysis using this data set, major factors are extracted and the influence on productivity is analysed.

Findings

By factor analysis, five factors were extracted. These factors may be named as (1) information utilization and KPI management, (2) power relationship with shippers, (3) Kaizen with shippers, (4) company-wide kaizen system, and (5) dependency on shippers. We find out that (3) Kaizen with shippers have a positive correlation with financial results.

Value

It has been an important issue to find out the productivity improvement factors, as many literature such as Japan Institute of Logistics Systems (2014) and

Hamazaki et. al. (2004) show. This paper adds value to the literature accumulation in the field of logistics service industry. Finding out factors such as the importance of Kaizen with shippers is original in this paper.

Research limitations/implications
Although the number of the respondents are enough for extracting factors, it may be not sufficient for analysing the concrete effects of factors on the productivity. Further efforts to gather more samples are necessary.

Practical Contribution
The paper suggests that Japanese trucking companies needs to pay more attention on Kaizen with shippers, and so on.

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SUPPLY CHAIN NETWORK EQUILIBRIUM MODEL WITH THE CYBERSECURITY INVESTMENT CONSTRAINTS

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Purpose The supply chain network game consists of a tier of manufacturers, a tier of retailers and a tier of demand markets. Game players individually seek to decide their cybersecurity investments to resist possible cyberattacks on the supply chain network. However, the manufacturers and the retailers are subject to budget constraints for their cybersecurity investments. Introducing the optimal cybersecurity investments with budget constraints would dramatically increase complexities on computing equilibrium of the supply chain network game.

Design/methodology/approach We construct a game model to describe interactions between directly linked tiers and apply the theory of variational inequalities to compute game equilibrium. We apply the Lagrange multiplier method to transform players' nonlinear investment cost function to be a solvable form of substitutional variational inequalities. And, applying the modified projection method, we calculate parameters such as budget constraints and cyberattacks loss through numerical examples for sensitivity analysis.

Findings We apply the modified projection method, using MATLAB (2016a), to compute four numerical examples and discuss their results. (1) The supply chain network players are active to make the cybersecurity investments for improve their utility within a certain range. However, the marginal utility of cybersecurity investment is declining and this leads to some players may rely on their competitors' decisions. (2) The more players in the supply chain network, the more players in the top tier will get more profits. This illustrates that the supply chain network should be flattened.

Value We combine cybersecurity investments with supply chain network equilibrium for studying. The numerical examples and their results would bring deep insights for theorists and practitioners about cybersecurity investment on supply chain network. Especially, the impact of changes in budget constraint, investment cost function, player numbers, and cyberattack loss, on equilibrium product transactions

COLD CHAIN CAPABILITY FOR FOOD COLD CHAIN MANAGEMENT: CONCEPT AND APPLICATION

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Purpose
This paper aims to investigate the resources and capability required for managing food safety and quality in the cold chain.

Design/methodology/approach
A total of 1834 questionnaires were mailed to frozen and chilled food manufactures in Taiwan. In total, 165 usable responses were received, a response rate of 9.1%.

Findings
Testing using resource-based theory of food cold chain suggested three important findings. First, intangible resources (cold chain knowledge and skills) are more important than tangible resources (cold chain infrastructures). Second, there are four dimensions of cold chain capability: correct temperature maintenance, increased goods moving speed, adherence to hygiene principles and employment of emergency response. Third, there is a positive relationship between cold chain capability and food safety and quality performance.

Value
Overall, this implied that food companies could develop cold chain capabilities as routine activities to stratify the needs of their customers in pursuit of better food cold chain performance.

Practical Contribution
In practice, these findings can be used by cold chain food companies when integrated into their cold chain guidelines

EXPLORING THE INFLUENCE OF ONLINE REVIEWS ON SUPPLY CHAIN DYNAMICS

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PurposeOnline reviews (e.g. review rating) play an important role in influencing purchasing decisions. Reflecting on customers' satisfaction with the product, online reviews can change future potential customers' expectation of products and thus influence the product demand. Although such influence is well-documented in marketing and information system literature, supply chain/inventory management models do not always bring this in and fail to investigate its effect on supply chain dynamics. Therefore, the aim of the research is to introduce online review in a supply chain model to explore its influence on supply chain dynamics.

Design/methodology/approach By integrating automatic pipeline variable inventory order-based production control system (APvIOBPCS) and consumer choice modelling based on customer utility, this paper models an e-retailer supply chain to explore online review's influence on supply chain dynamics, including bullwhip effect and inventory amplification. By conducting simulation experiments, this paper managed to uncover such influence on supply chain dynamics in different scenarios.

FindingsThe results show that the mechanism behind the influence of the online review on supply chain performance is complex. On the one hand, if no customer perceives a product above average, or if all customers perceive non-negative utility from the product, dynamics performance will not be influenced by the online review, regardless of whether it is used or not. On the other hand, when some customers perceive negative utility from the product while some others perceive positive utility, retailers' online review using will lead higher bullwhip effect and inventory amplification (than not using it), and the magnitude of such influence is moderated by coefficient of variation of customer numbers, lead time, product quality and mismatch cost.

ValueTo the best of our knowledge, this is the first paper which links online review to supply chain dynamics through mathematical models by using consumer choice modelling and APvIOBPCS. Instead of assuming demand pattern as exogenously given, this paper assumes the demand pattern will be influenced by online reviews (e.g. review rating) which is a function of inventory system parameters and customer utility. Our model can enable a better understanding of online review's influence from a supply chain dynamics perspective.

Research limitations/implications In this paper, only the situation where quality is correctly estimated is explored. Besides, our model assumes customers

cannot return the product even they are not satisfied with it. Future research can extend model to the scenario of over-/under-estimation of product quality and the scenario that return is permitted.

Practical Contribution As online reviews can lead negative influence on supply chain dynamic performance in some scenarios, companies need to consider the corresponding costs generated from such influence and make strategic decision about whether to offer the review systems to maximise their profit.

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OPTIMAL SHIPPING STRATEGIES FOR ELECTRIC POWER LOGISTIC NETWORKS IN TAIWAN

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Purpose
The vehicle routing problem (VRP) is widely studied in freight transportation and distribution fields, which aims to minimize the total system routing costs for covering demand requests while considering the limited loading space and shipping vehicles. This study examines the existing shipping patterns of electric power logistic networks in Taiwan, and jointly optimizes order frequencies and shipping patterns to improve the system efficiency.

Design/methodology/approach
Simulated annealing (SA), an improved K-means TSP approach, and other heuristic approaches will be examined in this study, to find a suitable shipping pattern of the studied network.

Findings
Optimal parts order frequencies and best shipping plans of the studied multi-modes and multi-commodities freight networks will be conducted in this study, while also considering the nonlinear-based transportation fare schemes.

Value
This paper specifies a mixed integer nonlinear programming problem for assisting electric power system operators in Taiwan to determine the optimal electric power parts order frequencies and the corresponding shipping plans

CRITICAL SUCCESS FACTORS FOR ADDITIVE MANUFACTURING ADVANCEMENT IN INDUSTRY

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Purpose
Researchers have outlined some significant conceptual operations benefits associated with the adoption of Additive Manufacturing (AM) processes for low-volume applications in a number of industry sectors, however uptake levels still appear to be low (Ghobadian et al., 2018). There is also a dearth of empirical exemplars profiling the successes and failures of AM implementation. This is evidence of the gap between research and practice regarding the application of the manufacturing process in contemporary manufacturing and service operations (Braziotis et al., 2018). This paper analyses the AM implementation cases of Suppliers operating in three industries to identify the supply chain factors that supported or militated success. This is in order to highlight the critical success factors necessary for the advancement of AM in manufacturing and service supply chains.

Design/methodology/approach
This paper follows a case study approach, focusing on AM implementation projects and AM SCs as the unit of analysis. Semi-structured interviews are employed to explore the experiences of different stakeholders involved in successful and failed AM implementation projects undertaken by suppliers. A purposive sample of 4 firms was selected in application sectors namely aerospace, automotive and power. A conceptual framework, underpinned by SC configuration theory and a structured approach to the make-or-buy decision, was used to develop the case study protocol, exploring the themes of strategy, structure and environment in the process (Cánez et al., 2000).

Findings
This paper outlines the determinant combination of triggers for AM adoption and the critical supply chain factors to be considered during the process of AM implementation.

Value
This paper highlights critical supply chain dimensions necessary for the advancement of AM, taking a particular focus on failed and successful implementation projects. The findings provide elaborates on generic prescriptions for AM adoption and SC factors in extant literature. It also provides

empirical evidence on the state of AM developments in the manufacturing and service supply chains vs the hype in the conceptual literature.

Research limitations/implications The research explores a few failed and successful cases of AM implementation across diverse industries. Validity of findings and conclusions can be further strengthened by analysing more cases per industry and including other SC tiers.

Practical Contribution
AM is currently in the developmental phase of its lifecycle for end-use parts applications. Highlighting the critical development paths is important for practitioners and policy makers to channel development efforts in crucial areas to accelerate development. Practical guidelines are provided for prospective AM implementation projects

A REVIEW OF SUSTAINABLE SUPPLY CHAIN MANAGEMENT IN THE TEXTILE AND CLOTHING INDUSTRY OF ASIAN EMERGING COUNTRIES

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Purpose The increasing awareness of SSCM issues within the textile business in Asian emerging countries (AEC), with different recent occurrences like devastated accidents of Rana Plaza and Tazreen Fashions in Bangladesh, the inhuman working conditions of Vietnam and contaminations of the local environment of India, has encouraged research into this area. However, there now exists a need to consolidate existing knowledge, and this influenced the researchers to present a consolidated view of sustainability in the current landscape. Therefore, the purpose of this research is to retrieve, scrutinize and synthesize the available research and get an in-depth knowledge about the SSCM in textile and clothing (T&C) industry and identify the fruitful areas for future research within the AEC context.

Design/methodology/approach A systematic literature review method, as proposed by Denyer and Tranfield, (2010), along with a self-developed framework is applied to assess the existing research papers available in selected 18 Asian emerging countries. Reviewed papers are collected from 5 scholarly databases and a pre-defined research protocol established and maintained for the quality assurance of the selected 41 reviewed papers.

Findings This research revealed an in-depth insight of SSCM of the AEC countries in terms of T&C industry. The review argues that SSCM could leverage the sustainable competitive advantage among business along with their sustainable factors like-environmental/green issues, carbon emission/foot print in SCs while different types of models like – fuzzy inference system, TQM, LP played a vital role in the operations. Moreover, it portrayed that factors like green mind set, attitude, leadership and management style of individual organization actors are also responsible for the sustainable practice in T&C industry and highlighted that, the AEC countries are focused on more government legislation and trade barriers for their sustainability rather than anything else in case of T&C business.

Value This paper synthesizes the available research papers of SSCM in T&C industry within the AEC context, identifying future research opportunities. The recommendations could provide guidelines for the academic and practitioners to focus on more targeted areas for efficient and effective use of SSCM within the context and also provide an important basis for reporting available research in the field of SCM.

Research limitations/implications The practical contribution of this research is to support the understanding of SSCM in textile business. Therefore, future

research should consider evaluating a focal firm's comparative SSCM by measuring the functional and relational aspects of T&C industry and as well as comparing findings from other industries.

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E-COMMERCE ORDER FULFILMENT: THE JINGDONG MODEL

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Purpose
The Chinese e-commerce market is the biggest and fastest-growing in the world. Though China's internet penetration is only 53% (2016 figure), close to 16% of all retail sales in China were from e-commerce, compared with UK (14.5%), US (7.1%) and South Korea (11.2%), all of which have internet penetration exceeding 85%. More significantly, the ecommerce market of China, already home to two of the world's most-noted online retailers – TMALL and Jingdong (also known as JD.Com) - is driven by the ubiquitous smart phones.
Despite the significance of Chinese e-commerce, the majority of the e-commerce fulfilment publications have been based on the experiences of companies in the western developed economies. The operational practices of China's e-commerce giants have not been systematically documented, though there are no shortages of news clips, promotional videos and online materials about different aspects of China's e-commerce successes. This study reviews the operational processes of Jingdong, examining how it organizes its logistical processes to meet the large volumes of online consumer orders with delivery speed and accuracy, to the satisfaction of its customers. Its objective is to build a theory of ecommerce fulfilment, a logistical phenomenon fast becoming a supply chain norm as Industry 4.0 takes hold.

Design/methodology/approach
Relying exclusively on secondary data sourced from the internet, this paper systematically pieces together the vast array of fragmented information on the Chinese ecommerce giant, Jingdong, to form a process model of ecommerce order fulfilment based on the company's logistical operations. Given the paucity of academic studies on Chinese ecommerce practices, in particular Jingdong's, this study will adopt an inductive grounded theory approach to develop research propositions.

Findings
The study found that Jingdong's success in the Chinese ecommerce market is the outcome of a tightly-woven network of online-offline operations geared to satisfying the logistical needs of individual customers. Jingdong is not only quick in embracing the latest in technological innovations but also invests in research and innovations in ecommerce fulfilment operations. Its order fulfilment processes feature an efficiently orchestrated, centrally monitored, locally-controlled robotic systems strategically blended with human intervention at critical articulation points. Leveraging on customer analytics to continuously

refine its last-mile delivery operations, the company places undue emphasis on offering an unparallel, uniquely individualized, purchase-receiving, as opposed to product-delivery, experience to all customers.

Value

The Jingdong's ecommerce model, as demonstrated by many of its promotional videos, has been an eye-opener to the logistics and supply chain community, in both academia and professional practice. This paper offers an incisive synthesis on these well-illustrated operational information to identify the theoretical underpinnings of Jingdong's ecommerce order fulfilment practice.

Research limitations/implications

This study contributes to the growing literature on ecommerce order fulfilment within an Industry 4.0 ecosystem driven by mobile phones in a country that is setting the pace, and norm, for future retailing. Understanding the processes put in place by one of its ecommerce giants to meet the evolving challenges of this new ecosystem offers refreshing insights for theory development.
A major limitation of this study is that it is drawn exclusively from secondary data sources. Future studies would benefit from an ethnographic investigation of Jingdong's ecommerce order fulfilment process.

Practical Contribution

Jingdong's ecommerce order fulfilment operations are in a class of their own. With China taking the lead in propelling ecommerce (or more appropriately m-commerce) to the next level of social shopping in an Industry 4.0 ecosystem, findings from this study could provide an insightful aid not only to budding ecommerce entities worldwide but also to companies eyeing a piece of the lucrative Chinese m-commerce market.

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EXTENDING SUPPLY NETWORK AND BUILDING CUSTOMER CONNECTIVITY: THE FLIPKART STORY

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Purpose

While much has been written about e-commerce operations, little has been documented about the end-to-end processes of e-commerce supply chain operations. Fewer still is how e-commerce supply chains were established. With the growing significance of m-commerce under omnichannel retailing, e-commerce supply chains are on the increase. While models of organizational growth and development abound, few of these models theorize the growth process of an organization's supply chain, let alone that of e-commerce. This study delves into the growth path of Flipkart, India's largest e-commerce retailer with a registered customer base in excess of 100 million. Its objective is to develop a theoretical process model of e-commerce supply chain growth.

Design/methodology/approach

To understand the growth path of Flipkart, we employed a longitudinal case-study design. The research was carried out in two stages. The first stage was desk research. We went through the chronology of milestone events outlined, and all the top stories provided, on the website of Flipkart (https://stories.flipkart.com/flipkart-timeline-milestones/). We then searched for published documents and news articles relating to Flipkart online to relate the milestone events to the larger context of India's socio-economic fabrics where its e-commerce market is firmly embedded. From these information, we attempted to make sense of the strategic actions taken by Flipkart and raised questions on the intentions behind those strategic initiatives.

The second stage was primary data collection. We conducted a series of semi-structured interviews with a member of the senior management team of Flipkart to seek clarifications to our questions. We triangulated the interview responses with both news articles and stories published on Flipkart's website to develop a process model to depict Flipkart's e-commerce growth path.

Findings

The success story of Flipkart, which grew from an initial investment of USD5,600 to become a multimillion-dollar online retailer within a period of 10 years, tells of how an e-commerce supply chain was made. This study found that Flipkart progressively grew its e-commerce supply chain by strategically engaging selected small suppliers either with special know-how or of innovative or high-demand products to give its website a distinctive niche as an e-commerce market of preference. It also introduced innovative means that fit with the unique socio-economic and cultural setting of India to connect with prospective purchasers. The staggering growth of its online traffic has made it a target of investors wanting a share of the budding Indian e-commerce market. Drawing

on the tenets of contingency theory and the conceptual underpinnings of the theory of fit, we develop a conceptual process model of high-performance e-commerce supply chain growth based on the experience of Flipkart.

Value
Although collaboration and integration of supply chain entities have long been acknowledged as essential ingredients of firm performance and growth, little has been documented on how e-commerce companies collaborate and integrate to form sustainable e-commerce supply chains. Examining the growth of Flipkart from the perspective of contingency theory and the concept of fit, this study offers a theoretical explanation on how e-commerce supply chains evolve to form configurations to propel them to achieve and sustain high performance.

Research limitations/implications
This research is based on the experience of a single firm, which is unique to the Indian socio-economic and cultural context. A multiple case study of the growth trajectory of other e-commerce firms in a range of socio-cultural settings is needed to validate and expand the theoretical constructs unearthed in this research.

Practical Contribution
Flipkart is a high-performing e-commerce company handling over 8 million shipments per month. Its meteoric growth trajectory within a span of 10 years holds many valuable lessons for budding e-commerce companies, both in and outside of India.

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OPTIMAL COLLECTION POLICIES FOR RETURNED PRODUCTS IN THE REVERSE SUPPLY CHAIN

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PurposeWith the emergence of e-commerce and increasing customer service expectations, a growing number of firms are leveraging return policies to drive a strategic competitive advantage. This presentation focuses on the development and comparison of two collection models. These models will serve to reduce the firm's inventory and transportation costs by leveraging economies of scale and optimizing the collection period. This occurs across multiple initial collection points (ICP) before transshipping the returned products to a centralized return center (CRC). The optimal collection policies for the case of multiple ICPs and a single product is presented: 1) individual shipment policy and 2) combined shipment policy. Mathematical models in terms of collection periods are developed for calculating the combined inventory and transportation costs of both policies, and an optimization approach is designed to minimize the number of computations required to reach the optimal collection period. Finally, the results are presented with an experimental dataset. This work demonstrates the added complexity of dealing with two ICPs and develops mathematical models for the resulting collection policies.

STRATEGIC FACTORS GOVERNING BLOCKCHAIN TECHNOLOGY IMPLEMENTATION IN FOOD SUPPLY CHAIN: HYBRID MODEL AND METHODOLOGY INVOLVING SWOT-FAHP

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Purpose
Blockchain technology has been successfully implemented in financial sector, however, in the case of logistics and supply chains there are much hype about ensuring trust, traceability and transparency through blockchain technology but not implemented as equivalent to financial sector. Many large technology companies such as IBM, Oracle are pursuing blockchain implementation strategies for supply chain consortia that use the applications from these vendors. A few notable blockchain applications/projects in the current food system have appeared in last couple of years such as provenance.org, IBM food traceability, ripe.io, blockshipping, SkuChain, Walimai, WaBi and so on, though some of them are still in the pilot stage. The well-known benefits from blockchain implementation in food supply chain are to reduce food fraud and errors, to solve supply chain inefficiency, to enable food traceability, to improve inventory management and safety recalls, to minimize transport costs, to reduce delays from paperwork, to identify issues faster and to increase consumer and partner trust. However, knowing there are substantial benefits out of blockchain implementation still stakeholders in food supply chain are hesitant to implement due to several reasons. Hence, we find there is a huge gap in identifying strategic implementation factors and non-availability of suitable model and methods to make trade-off decisions. The study answers the following research questions: What are strategic factors governs blockchain technology implementation and the suitable model and methodology for wider community to decide on implementation.

Design/methodology/approach
The study identifies several implementation factors through literature review, whitepapers, blockchain projects and discussion with practitioners from food and technology sector. Based on the evidences the study develops a multi criteria decision making (MCDM) model for evaluating blockchain technology implementation factors. The model combines SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis and FAHP (Fuzzy Analytic Hierarchy Process) approach. The study considers implementation strategies related to technology, legal, business and organisational aspects. SWOT analysis helps with strategy formulation to identify strengths and weaknesses (S-W), as well as broader opportunities and threats (O-T) of blockchain implementation, whereas FAHP gives analytical priorities to evaluate blockchain implementation strategies listed under SO, ST, WO, WT to decide on. The developed model is validated with a Turkish food sector case involving multiple stakeholders.

Findings
The developed model is illustratively pursued among participants of a food supply chain consortium to evaluate implementation strategies of blockchain.

The decision-makers are out on most of technologies but it is important for every participant to understand that they exist and how they may affect operations in the short and long term. The findings of this study show that the implementation strategies of blockchain depends on the readiness of consortium and the degree to which changes are planned, managed conducted, and utilized. Thirty-two strategic factors according to SWOT are identified and four implementation strategies are determined depends on low, regular, special and high attentions. In terms of SWOT-FAHP evaluations it is found out under which circumstances a consortium should choose what implementation strategy.

Value
This study adds novel technology application knowledge from the emerging economy perspective in a food sector. This research would be the first research to evaluate the implementation strategies of blockchain technology in the food supply chain ecosystem and also it gives practitioners in food industry a perspective to understand the decision making to adapt blockchain technology to their industry.

Research limitations/implications
The application of this study is limited to the Turkish food sector.

Practical Contribution
This study has several practical implications to the food sector such as implementation strategy of blockchain technology for enabling food transparency and food safety.

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SUPPLY CHAIN RESILIENCE FROM AN OUTSOURCING PERSPECTIVE: A CRITICAL LITERATURE REVIEW ON 3PL NETWORK DESIGN STRATEGIES AND SUPPORTING QUANTITATIVE OPTIMIZATION METHODS

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Purpose
Global supply chains are dynamic, complex systems vulnerable to numerous risks due to their interconnectedness and interdependent relationships. Competitiveness has driven companies to outsource their logistics activities to third-party logistics (3PL) providers. At the same time, supply chain risks and uncertainties have also shifted to 3PLs. Thus, 3PLs networks should be designed to maintain equilibrium and succeed even through the unexpected. This paper aims to conduct systematic and structured review of relevant publications from 2008 to 2018 we provide a framework of the 3PLs network design strategies and modeling approaches.

Design/methodology/approach Systematic literature review is a procedure of selecting papers and reviewing the existing literature (Wilding and Wagner 2014 , Barbosa-Povoa et al. 2017). To identify and collect the published research we adopted a two stage approach. Initially, we used Web of Science and Science Direct as a search database and selected a sample of search keywords based on the terminologies used in supply chain risk management. Subsequently, we performed a content analysis through the scanning of abstracts, conclusions as well as the whole article to identify those that fully satisfy our requirements.

FindingsIt was found that the concept of resilience from a 3PL perspective has not been explicitly addressed. Most publications are dealing with the definition and principles of resilience, focusing at response to a high frequency, low impact disruptions. Disruption strategies that help a supply chain to grow and move to a new better state have not been investigated. Although the use of OR/MS methods has been acknowledged in the literature, more emphasis has been laid on optimizing the supply chain in terms of cost effectiveness.

ValueThis paper provides a unique review of the literature review on articles addressing supply chain resilience from a 3PL perspective. So far literature reviews (address the concept of supply chain resilience from a holistic point of view disregarding the risks and opportunities of firm's decision to delegate logistics services to 3PLs.

Research limitations/implications
A research agenda is proposed to better understand resilience for 3PL supply chain network design and the utilization of quantitative methods to support the

ability of these networks to recover and grow in the event of deviating conditions.

Practical Contribution

The provides a 3PL supply chain resilience framework based on state-of-the-art literature. Companies can not only perform damage control but improve their competitiveness.

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BIG DATA OF IOT IN INTELLIGENT MANUFACTURING SUPPLY CHAIN: OPPORTUNITIES AND CHALLENGES

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Purpose

It is obvious that industrial data has increased on a large scale over the last two decades, manufacturing is entering the era of industrial big data and big data-driven intelligent manufacturing. While Internet of Things (IoT) data would be indispensable part of industrial big data in intelligent manufacturing supply chain [1]. The aim of this study is to review the state-of-the-art of IoT big data in intelligent manufacturing both from theoretical and practical perspectives to explore opportunities and challenges of extraction of big data value. Firstly, we briefly provide an overview of big data of IoT in intelligent manufacturing. Then, we highlight the importance of utilization of IoT big data in intelligent manufacturing supply chain. The issue of value-adding of big data of IoT is proposed. Secondly, we discuss some opportunities and challenges on big data of IoT in intelligent manufacturing. Thirdly, we explore how manufacturing enterprises behave to improve the level of intelligent manufacturing in terms of extracting the value of big data of IoT.

Design/methodology/approach

In this study, we integrate the content analysis method and in-depth interview together. More precisely, based on content analysis, we firstly conduct a comprehensive literature review on IoT big data in intelligent manufacturing supply chain. Then, we make in-depth interviews with different manufacturing enterprises. Through exploring the gaps between the actual problem facing by manufacturing enterprises and the theoretical study, we discuss the opportunities and challenges on the extraction of big data value in intelligent manufacturing.

Findings

In this study, we can understand the gaps between theoretical research and practical application in the utilization and valuation of industrial IoT big data. We identified key opportunities, challenges and knowledge gaps. Some suggestions are given to improve the intelligent level of manufacturing in terms of utilization of IoT big data.

Value

Industrial big data is an important strategic resource for the transformation and upgrading of manufacturing industry [2]. While IoT would be the new and fastest-growing sources of industrial big data [3]. Therefore, the utilization of IoT big data, in particular big data valuation would be the key in implementing intelligent manufacturing supply chain. The results of this study will provide some suggestions from the practical and theoretical perspectives. For instance, some measurements should be done for manufacturing enterprises to enhance the application of IoT and the big data analytics. In addition, the requirement of

specific techniques, tools and methods to improve the extraction of value of IoT big data is given.

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OPTIMIZATION MODEL FOR THE GENERAL SHARE-A-RIDE PROBLEM WITH ELECTRIC VEHICLES

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Purpose
This research introduces an extension of the general share-a-ride problem or G-SARP (Li et al., 2014; Yu et al., 2018), called the G-SARP with electric vehicles (G-SARP-EVs). This problem considers a taxi fleet with mixed plug-in electric vehicles (EVs) and gasoline vehicles (GVs) can service passenger and parcel requests simultaneously. In this problem, a taxi is allowed to convey more than one passenger at the same time, and there is no restriction on the maximum riding time of a passenger. In addition, the number of parcel requests that can be inserted between the pick-up and drop-off points of a passenger is limited only by vehicle capacity. This problem focuses on advance requests that are given prior to the beginning of the planning horizon.

Design/methodology/approach
This research develops a multi-layer time-space network to effectively describe the movements of taxis in the spatial and temporal dimensions (e.g., Mahmoudi and Zhou, 2016). While each EV operates on its own layer of the network, a dedicated layer is designed for the GVs in the taxi fleet. The EVs have the priority to service the passenger and parcel requests. Only when the number of EVs is insufficient to satisfy all the requests, will GVs be assigned to service some of them. An optimization model is formulated based on the multi-layer time-space network to determine a set of optimal routes and schedules for the taxi fleet to service the given requests, while satisfying operating constraints for EVs and GVs. The objective is to maximize the profit of the taxi company.

Findings
To examine the performance of the proposed model, this study generates a number of numerical instances with various sizes from the data provided by a logistics service provider in Taiwan. The results show that the proposed approach is able to effectively obtain the optimal routes and schedules for the taxi fleet to service all the requests.

Value
The obtained numerical results provide valuable insights into successfully implementing a taxi sharing service. We believe that the G-SARP-EVs and its optimization model should be able to assist taxi companies with heterogeneous fleets to solve scheduling problems in practice. In addition to brining benefits to the enterprises, replacing GVs with EVs will also reduce emissions and fuel consumption from the transportation sector.

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VOLUMETRIC OPTIMIZATION OF FREIGHT CARGO LOADING: CASE STUDY OF A SME FORWARDER

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PurposeFreight forwarders faces a challenging environment of high market volatility and margin compression risks. Hence, strategic consideration is given to undertaking capacity management and transport asset ownership to achieve longer term cost leadership. Doing so will also help to address management issues, such as better control of potential transport disruptions, improve scheduling flexibility and efficiency, and provide service level enhancement.

Design/methodology/approach The case company currently has truck resource which is unprofitable, and the firm's schedulers are having difficulty optimizing the loading capacity. We apply Genetic Algorithm (GA) to undertake volumetric optimization of truck capacity and to build an easy-to-use platform to help determine potential costing savings that can be attained, and whether if the business should expand its internal truck fleet.

FindingsOur analysis suggests that the case company's truck resource is underutilized by about two-thirds of capacity. Through a proposed mathematical model and GA heuristic, the case company can potentially save up to S$567K per annum.

ValueBy using a simple GA and incorporating a visually appealing user interface, we have helped a freight forwarder improve her financial and operational efficiency. The game changer is the scalability of the solution to include more resource optimization across the fleet and across more freight forwarding firms

INCORPORATING CARGO LOADING FEASIBILITY INTO A B2B DELIVERY VEHICLE ROUTING PROBLEM

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Purpose
The vehicle routing problem (VRP) with loading constraints is a widely studied combinatorial optimization problem in freight transportation and distribution industries, which aims to minimize the total system routing costs for covering customers demand and determine a feasible loading plan of the shipments into the available storage space.

Design/methodology/approach
It should be noted that most above studies tend to apply the 'packing first, routing second' strategies to solve this combinatorial problem. Different heuristic approaches will be examined in this study.

Findings
A practical B2B data analysis will be implanted first, to explore the features and linkages of the studied database. Furthermore, an integrated VRP with practical loading constraints with B2B data analysis will be conducted in this study.

Value
Since the combinatorial loading and routing optimization problem becomes one of the great challenges faced by logistics service providers, this paper aims to develop a 'feasible packing with optimal routing-based' heuristic algorithm to solve this problem in a timely manner

3PL-INITIATED LOW CARBON SUPPLY CHAIN INTEGRATION: ANTECEDENTS AND CONSEQUENCES

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Purpose It is recognized that third-party logistics service providers (3PLs) have been evolving into supply chain orchestrators, playing a critical role in the supply chain. Given an increasing concern on low-carbon supply chain in recent years, it is also found that 3PLs have been in a critical position for greening supply chains. In response to this emerging phenomenon, this study provides an investigation of 3PL-initiated low carbon supply chain integration.

Design/methodology/approach Drawing upon service-dominant logic, this study develops a research framework and empirically examines it in China. A questionnaire survey data of 348 Chinese 3PLs are used for the analysis and a structural equation modelling (SEM) is applied to analyze the data collected.

Findings As to the antecedents, data analysis shows that 3PLs' sustainability strategy and users' low-carbon outsourcing need have positive effects on 3PL-initiated low carbon supply chain integration. As to the consequences, it is found that 3PL-initiated low carbon supply chain integration has positive effects on 3PLs' economic performance as well as the supply chain performance, whereas 3PL's economic performance also has a positive effect on supply chain performance.

Value Our findings highlight the strategic role of 3PLs in decarbonizing supply chains, and provide empirical support for using integration as a way to achieve low-carbon supply chain

A MULTI-CRITERIA KEY OPINION LEADER SELECTION MODEL FOR DIGITAL MARKETING IN E-COMMERCE BUSINESS

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Purpose

This paper describes a Multi-criteria Key Opinion Leader Selection (MKOLS) model for digital marketing in the Business to Consumer (B2C) e-commerce business. It aims at selecting an appropriate Key Opinion Leader (KOL) in supply chain to target different customer segmentations based on branding position and product feature.

Design/methodology/approach

The MKOLS model makes use of the data collected from the social media platform and e-commerce business environment for decision making in the KOL selection problem. A hybrid approach with decision tree analysis and fuzzy analytic hierarchy process (FAHP) is introduced for multi-criteria decision making. Due to the limitation of FAHP in handling a large number of decision alternatives, decision tree analysis is integrated into the model for classifying KOLs into different groups before pairwise comparisons.

Findings

To demonstrate the feasibility of the proposed model, a case study is conducted in an American-brand headphone company. The tailor made MKOLS model helps to facilitate the KOL selection process so as to target young consumers in the online supply chain e-commerce platform.

Value

In the era of digitalization, supply chain planners face tremendous challenges in transforming their operation strategies through e-platform. Traditional marketing strategies are no longer able to attract the young generation effectively via television, print and broadcasting media. Adopting inappropriate promotion strategies will waste company resources due to the lack of a suitable platform to connect with young customers, and will narrow the target market. Therefore, choosing appropriate communication channel, i.e. KOL, for catching young peoples' attention is critical. This paper contributes to a practical approach for identifying KOL for digital marketing, which is an emerging trend in today's e-commerce market

SMART HOME DEVICES AND B2C E-COMMERCE: A WAY TO REDUCE FAILED DELIVERIES

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Purpose
B2C e-commerce is fast spreading all over the world. If compared to the offline market, it opens new challenges for companies, and one of these is higher complexity of the logistics activities. In particular, one of the most critical processes in the logistics field, due to its impact on both costs and service level, is the last-mile delivery – i.e. the "final leg" of the order fulfilment, aimed at delivering the products to the final consumer. More in detail, a very significant issue is that of the failed deliveries, i.e. the deliveries not accomplished due to the absence of the customer. They both imply high costs for e-commerce players – that need to re-schedule them – and have a negative impact on the satisfaction of customers. A way to face this issue could be scheduling the deliveries based on the probability to find customers at home. A promising alternative for gathering data on the customer presence is represented by Internet of Things devices, whose diffusion has been significantly growing in recent years.

Design/methodology/approach
The solution presented in this paper aims at building presence profiles of customers based on data collected through smart home devices (e.g. smart home speakers) able to detect people presence at home during the day and along the week. In addition, the work develops the analytical formulation of a Vehicle Routing Problem that schedules deliveries, aimed at reducing not only the travelled distances – as it happens in traditional VRPs – but also the number of failed deliveries. More specifically, the routing algorithm is composed by two sub-stages. First, it carries out a pre-allocation of customer orders to specific time-windows, based on the probability of the customers to be at home when deliveries are performed. Second, the algorithm finds the sequence of customers to be visited during the day that optimises the routing.

Findings
The application of the model to a case in Milan shows that the proposed solution implies a significant reduction of missed deliveries – about -16% – with respect to the traditional operating mode (in which the probability of finding the customer at home is not considered while scheduling the deliveries).

Accordingly, even if the pre-allocation of customers based on probability increases the total travel time, the average delivery cost per parcel decreases.

Value

This work provides both academic and managerial implications. On the academic side, it contributes to the literature while developing an innovative probability-based Vehicle Routing Problem that, differently from other existing works, exploits new technological trends (e.g. the diffusion of smart-home devices). On the managerial side, it proposes a novel solution for scheduling B2C last-mile deliveries that relies on the use of smart home devices, and that has a significant impact in both reducing operating costs and increasing service level

A MODEL TO ASSESS THE ENVIRONMENTAL IMPACT OF B2C E-COMMERCE IN THE CONSUMER ELECTRONICS INDUSTRY

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Purpose

B2C e-commerce has been growing in all of the main western markets over the last years, both in terms of market value and penetration rate, i.e. online sales as a percentage of overall retail sales. From an environmental sustainability viewpoint, it is unclear whether the online shopping has an higher or lower environmental impact if compared to the traditional offline purchase. Among the various retail sectors, the consumer electronics industry is the most developed one with the largest online penetration rate (i.e. from 24% up in the most advanced markets such as USA, UK, China, Germany, France and Italy) and a consequent significant number of sold – and then home-delivered – products. This work aims to assess the environmental impact of the purchasing process in the consumer electronics industry, in order to evaluate the significance of the environmental impact in a sector that has achieved a relevant level of development and, more generally, to understand what to expect from e-commerce growth in the coming years.

Design/methodology/approach

This work is based on an activity-based model. The traditional shopping is compared to the online purchasing in terms of CO_2e emissions. The generic e-commerce process considered by the model is composed of five phases: pre-sale and sale, order picking and assembly, stock replenishment, delivery (only intended by courier) and post-sale. The offline shopping differs from the online one in several ways, including the main ones such as the absence of the picking and assembly phases, which are performed by the customer himself at the point of sale. The model determines the environmental impact of each activity carried out in each process phase. Interviews with logistics operators and secondary sources were used to develop and feed the model. The developed model is applied to the Italian context.

Findings

The environmental impact in the online purchasing process is about 30% lower if compared to the offline shopping. In particular, emissions in the online and offline processes are respectively 3.03 and 4.31 kg CO_2e per order, which is generally made of few pieces (i.e. about 1.2). The impact of logistics is generally high in both the purchasing processes. In particular, logistics-related activities cause almost all the emissions in the online shopping (i.e. 98%) and about the 75% in the traditional purchasing. The results are affected by several

parameters, in particular by transport-related activities (e.g. the average distance travelled by the customer in the traditional purchase, or by the van in the online shopping).

Value
The model presented in this work has both academic and practical implications. From the academic viewpoint, the model represents a theoretical contribution in the definition of the online and offline purchasing processes, in the quantification of the environmental impact for each process phase and in trying to solve an open debate in literature. From a practical perspective, the model is intended to be an easy-to-use tool for merchants who aim to quantify the environmental impacts of their business and identify areas of action to reduce them

OPTIMAL ROUTING OF ORDER PICKERS IN THE LEAF WAREHOUSE

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Purpose
In manual picker-to-parts order picking systems, order pickers walk or drive through the picking area in the warehouse to retrieve the items requested by customers. The time order pickers spend on travelling through the warehouse accounts for almost 50% of the total order picking time. Therefore, reducing this non-value adding time will lead to a reduction in the total warehouse operating cost. Thus, the purpose of this paper is to develop a procedure for optimally routing order pickers through warehouses following the leaf layout.

Design/methodology/approach
The order picker routing problem in a warehouse is identical to the problem of finding the shortest picking tour in the graph representation of the warehouse. For optimally routing order pickers through the warehouse, we adapt the algorithms of Ratliff and Rosenthal (1983) and Roodbergen and de Koster (2001) that are based on an Eulerian graph and a dynamic programming procedure to the case of the warehouse layout investigated in this paper. The proposed procedure is evaluated in comprehensive numerical experiments.

Findings
The proposed solution procedure generates the minimum-length order picking tour and thus contributes to lowering the cost of warehousing. Its computational time is low, which enables warehouse managers to create efficient order picking routes quickly.

Value
The majority of the procedures developed for order picker routing are only applicable to conventional warehouses with parallel picking aisles. For non-conventional warehouses, only a few optimal algorithms have been developed so far, which makes it difficult to efficiently manage these warehouses in practice. This paper contributes to closing this research gap by developing an optimal order picker routing strategy for non-conventional warehouses following the leaf layout. The results of the paper at hand are valuable for warehouse managers that are interested in improving the efficiency of their order picking operations in the leaf warehouse.

Research limitations/implications
One limitation of our proposed algorithm is that it is only applicable to a warehouse with a leaf layout. To apply it to other warehouse layouts, a modification is required.

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EVOLVING TOWARDS A SMART FACTORY OF THE FUTURE WITHIN SUPPLY CHAINS: SELECTED CASES OUT OF THE ALPINE SPACE

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Purpose

Since the emergence of the fourth industrial revolution, supply chains stakeholders experience increased innovation activities towards internally and externally interconnected Factories of the Future (FoF). FoF is a "new industrial revolution" [1] resp. a vision that blurs traditional boundaries: FoF requires a re-design of organizational and operational structures [2], incl. the increased integration of all supply chain stakeholders equally into supply chain services and processes [3]. Objective of such factories are to not only be smart and technologically mature but highly performing, environmentally friendly and clean as well as social sustainable too [4]. Basing on 96 case study interviews within five Alpine Space countries, the purpose of this paper is to explore and describe the path towards the evolution of an "ordinary" supply chain stakeholder towards an integrated FoF within global supply chains. This paper is guided by research question "How can ordinary supply chain stakeholders innovate and evolve to smart Factories of the Future?".

This research is guided by the case study approach of Eisenhardt (1989) [5] and Eisenhardt & Graebner (2007) [6]. Case study research, as Eisenhardt & Graebner (2007) highlight, typically exploits opportunities to explore a significant phenomenon under rare or extreme circumstances. It is embedded in rich empirical data and "can richly describe the existence of a phenomenon" [6]. Empirical data of this research are captured within 96 single case study reports (c.f. Figure 1) about a) investment into digital technologies, b) ability in perceiving and facing a new business model for digital transformation and c) knowledge transfer and collaboration towards the innovation and evolution towards smart Factories of the Future. Participants of case study interviews are industrial organizations, academic institutions and regional policy maker organizations. As Figure 1 highlights, the single case study reports are merged to one multi case study report, which is the sampling unit of this paper at hand. By application of coding-processes proposed by the Grounded Theory (e.g. [7]–[9]), this multi case study report get structurally analysed and the findings presented within this paper.

The first narrative analysis highlights that strategy, technology, capacity for innovation, ecosystem support for innovation and skills and change management are critical success factors to become a FoF [10]. However, applied structured case study analysis goes beyond this critical success factors. It deepens into case study partners' individual activities and explores recommendation for actions and strategic policies. Thus, this paper develops new theory and contributes to a better understanding about the evolution of "ordinary" organizations towards a smart FoF. This paper at hand supports scholars and practitioners to manage, engineer and design the system's evolution towards a

smart, technologically mature, highly performing, environmentally friendly and clean as well as social sustainable Factory of the Future.

CAN FIRMS BE INNOVATIVE THROUGH ENGAGING WITH EXTERNAL PUBLIC SECTOR PARTNERS? A CASE STUDY OF AUSTRALIAN ADVANCED MANUFACTURING SMES

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Purpose

Several extensive reviews of innovation research by the Australian Government have emphasised the need to broaden our understanding of innovation. It is through new knowledge, access to proven technology and effectively implemented innovation that Australian advanced manufacturing SMEs can help build, grow and maintain a strong Australian manufacturing industry. The relative cost of innovation is higher for small and medium-enterprises (SMEs) than large firms, often due to their limited available resources. There is a paucity of research into the way advanced manufacturing SMEs (AMSMEs) effectively implement technological product and process innovation in collaboration with external partners. This research enhances knowledge of the importance of resource transfers from public sector partners to this category of SMEs. It asks and answers the question: How and to what extent do the innovations of Australian manufacturing SMEs benefit through engagement with public sector partners?

Design/methodology/approach

The researcher conceptualised and then empirically tested a framework of external partners as knowledge sources to SMEs practising technological both product (goods and services) and process innovation. Five case study interviews were conducted with grant-recipient, advanced manufacturing SMEs. The Dynamic Capabilities View (DCV) was employed as a perspective for examining the combination and configurations of internal and external resources that enable a firm to build new capabilities which allow them to effectively implement innovation.

Findings

Results reveal that AMSMEs benefit from access to tacit and codified knowledge possessed by expert researchers and practitioners. Through Commonwealth Scientific and Industrial Research Organisation (CSIRO) facilitated grants AMSMEs are connected to experts with access to otherwise inaccessible testing and validation equipment. The new knowledge was found to contribute to process and product innovation benefits that can be expected to lead to market

and financial benefits especially in the pre-production stages of concept and R&D.

Value
Theoretically and practically the study enhances understanding of the interrelationship between process and product innovation as called for by Camisón and Villar-López (2014). The resource transfers provided by external partners clearly do enhance SMEs' abilities to effectively implement innovation and thus assist Australian manufacturing's vital shift of focus from heavy industry to high tech products based on sustainable and advanced processes.

Research limitations/implications
Future research, extending beyond external resources identified in this framework should allow comparative analysis between differing classes of external research providers (i.e. external market and commercial sources) and differing categories of SMEs (i.e. non-grant recipient).

Practical Contribution
The findings of this study could help facilitators of public sector research-industry collaboration programs and of AMSMEs increase their understanding of how to improve process and product innovation output through identification and collaboration with external public sector partners as sources of new knowledge. Beyond specific utility in the manufacturing sector, a unique framework, conceptually developed and empirically tested would substantially enhance knowledge and material resource transfers in other industries, sectors and economies.
Keywords:
Technological innovation. Product and process innovation, Australian manufacturing SMEs, Collaboration and public sector partners, SMEs, Knowledge

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ANALYSIS OF IOT ADOPTION FROM A SUPPLY CHAIN COLLABORATION PERSPECTIVE

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Purpose
Internet of Things (IoT) connects numerous sensors, actuators and data processors, thus provides solutions to problems arising from information asymmetries and complexities in supply chains (Ng et al., 2015). Although the application of IoT will be the future of supply chain management, the main barrier against implementing it still lies in inter-firm issues. Despite the increasing importance of supply chain visibility, information sharing in practice is not widespread, which can be attributed to trust and confidentiality issues (Ali et al., 2017). Considering this problem, this paper aims to highlight opportunities and challenges that can be posed by the adoption of IoT. More specifically, it investigates current logistics practices where IoT is used and then analyses the examples through a supply chain collaboration lens, by focusing on the impacts of this technology adoption across supply chain entities.

Design/methodology/approach
Two case studies, including a case of using temperature control sensor and a case of transporting a particle accelerator component, are conducted to depict in-use applications of IoT in inter-firm settings. An analysis using a CIMO (Context-Intervention-Mechanism-Outcome) framework highlights why and how technological advancement is needed and to what extent supply chain entities can be affected by the IoT. Further analysis demonstrates the benefits and risks of data sharing within a supply chain by the IoT adoption. The data is collected via interviews, focus groups, and direct participant observations.

Findings
IoT adoption is a practical solution to multiple logistics issues, spanning from monitoring temperature fluctuations and mechanical shocks to knowing the precise delivery time and route quality. However, its impacts were varied across supply chain entities because the relevance and usefulness of the data depend on specific entities. In a similar vein, the perception of benefits and risks from data sharing was different when involving costs for investment and responsibilities for any logistics glitches. Consequently, several propositions were drawn to discuss collaboration issues when IoT is adopted to logistics operations.

Value
This paper addresses the issues arising from the IoT adoption, by taking a supply chain collaboration perspective to identify the hurdles which lead to slow implementation of the IoT in logistics through studying multiple case studies.

Research limitations/implications
The paper contributes to the emerging area of the IoT in logistics and supply chain management by exploring the main issues behind implementing these practices across companies in the networks. It will also provide relevant

knowledge to on-going discussions on the power asymmetry and failure in data sharing since the introduction of the Electronic Data Interchange (EDI) (Webster, 1995).

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LOGISTICS SUPPORT MODEL FOR CROSS-BORDER E-COMMERCE BETWEEN JAPAN AND CHINA

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Purpose

The market size of Cross-Border E-Commerce towards China is rapidly expanded. Many Japanese retailers try to enter it. On the other hand, this change showed up some problems on custom clearance. Therefore, Chinese government revised custom institutions. Some logistics service providers modify their support system to fit these changes for retailers. This paper analyzes current situation of Cross-Border E-Commerce from Japan to China and some Cross-Border E-Commerce support models, and then we examine appropriate commodity for each model.

Design/methodology/approach

Firstly, we survey current situation of Cross-Border E-Commerce researches in Japan and China. Based on these researches, we construct some types of Cross-Border E-Commerce logistics system. Each model has characteristics of logistics and marketing. We analyze what kind of commodity fit each model from logistics and marketing perspective.

Findings

We define 4 types of Cross-Border E-Commerce support models (EMS, Bonded Area, Consolidated Air -Chinese EC site- and Consolidated Air -Japanese EC site-) based on JETRO (2016). In Cross-Border E-Commerce market toward China, it is said that large part of it is EMS model. However, it is difficult to check custom clearance of a lot of EMS. Chinese custom tries not to miss collecting taxes by promoting other 3 types of models. In this paper, we focus on these models. The advantages of Bonded Area model are short lead-time, low cross-border logistics cost and big ability to attract consumers (This is because Bonded Area is mainly used Chinese E-Commerce retailers such as Alibaba for Cross-Border E-Commerce). On the other hand, the disadvantage of that are high inventory cost, risk of unsold inventory and management cost for EC site. Therefore, appropriate items of this model are top selling and large volume (or heavy weight) such as paper diaper.

The advantages of Consolidated Air are low inventory cost and risk of unsold inventory. The disadvantage of that are long lead-time, high cross-border logistics cost. In the case of Chinese EC site, big ability to attract consumers is also advantage and high management cost for EC site is also disadvantage. In the case of Japan site, management cost is low but small ability to attract consumers. Therefore, momentary trend items which has enough volume of sales to manage Chinese popular EC site are fit for Consolidated Air -Chinese EC

site- model. In the case of Consolidated Air -Japanese EC site- model, niche items are suitable.

Value
This paper suggests international logistic model of Cross-Border E-Commerce for Japanese E-Commerce retailers and logistics service providers. Cross-Border E-Commerce market situation toward China is drastically changing. Therefore, we hope this paper is valuable not for current market participants but for potential ones.

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COORDINATING A TWO-LEVEL SUPPLY CHAIN WITH UNCERTAIN DELIVERY PERFORMANCE

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Purpose
This paper investigates the impact of coordinating a two-level supply chain, consisting of a vendor and multiple buyers when delivery performance is taken into consideration. Specifically, an earliness or a lateness delivery cost are incurred each time an order arrives early or late, outside a delivery time window. Early and late deliveries introduce inefficiencies and additional costs into the supply chain. Early deliveries contribute to additional inventory holding costs, while late deliveries may result in production interruptions, lost sales and loss of customers goodwill. Traditional supply chain models have ignored the impact of untimely deliveries, resulting in often biased decisions that do not optimize the supply chain when untimely deliveries are taken into consideration.

Design/methodology/approach
We develop a mathematical model for each of the vendor and multiple buyers, and for the total supply chain costs. We analyze both scenarios: with and without coordination. We derive analytically the optimal replenishment decisions for the buyer and vendor under each scenario. Then, when the delivery time window follows the Asymmetric Laplace distribution, we analytically derive a closed-form expression for the optimal supply chain ordering decisions, and analytically obtain sensitivity results of the optimal decisions as the earliness cost, lateness cost, and delivery window change. We also perform extensive numerical analysis.

Findings
We derive closed-form expressions for the optimal vendor and buyers' decisions when untimely delivery costs are accounted for in the cost function. We show that traditional supply chain models that ignore the untimely delivery costs tend to underestimate the buyer's order size and overestimate the vendor's order. Additionally, when untimely delivery costs are incorporated, supply chain coordination significantly lowers the supply chain cost, by an average of 40% compared to traditional supply chain models.

Value
This paper has significant practical implications. In today's global and competitive environment, companies compete to reduce costs, increase efficiency, and increase customer service level. Delivery performance is a critical supply chain performance measure that directly impacts customer satisfaction level. We show that when delivery performance is properly accounted for, it impacts the various players' decisions and improve the profitability of the supply

chain. More importantly, we show applying traditional models in this case often result in biased and suboptimal decisions

REVISITING THE SYSTEMS ENGINEERING APPROACH TO THE DESIGN OF LOGISTICS SYSTEMS.

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Purpose

Design science research (DSR) is articulated as practice-oriented research whereby specific designs, of business systems, yield generic knowledge. DSR has its origins in the professional disciplines, e.g. engineering/medicine, that seek to solve problems with solutions that can have generic applicability. While it is claimed that the substantive output from DSR is the generic design we argue that the design science 'research design' (DSRD) requires attention. We argue for a generic DSRD, to guide researchers in choosing the right methods to solve specific contextual problems.

Design/methodology/approach

We build on relevant research notably engineering design and systems engineering, the latter having explicitly influenced logistics research. Such research advocate systematic approaches to problem solving, with reference to the need to address not only technological and process factors but also the social aspects. We determine the limitations of the existing methods and, via a synthesis of the existing literature, propose a new DSRD.

Findings

We find a number of similarities between the existing methods proposed with a classic four-stage systems engineering approach (Analysis, Design, Implementation and Operation) offering an underpinning construct for a DSRD. The DSRD needs development in order to account for the human aspects. While there is a tendency to approach problem solving from a quantitative modelling perspective with an aspiration to establish optimum designs, the development of soft systems methodology has enabled the social science aspects to be given due consideration. Also, the driver for change, i.e. the problem, needs to be explicitly attributed. The generic DSRD accounts for varying degrees of uncertainty hence the translation of complex problems into simple designs.

Value

We propose a generic DSRD to support ongoing endeavours to define the modus operandi of DSR. The generic DSRD is adaptable depending on whether the defined problem is simple, complicated or complex, hence establishing the

requirements for quantitative and/or qualitative research methods and whether the final design is defined by exact rules and/or guiding learning-action cycles.

Research limitations/implications

The generic DSRD needs field testing and refining based on reflections from lessons learned from such evaluation.

Practical Contribution

The generic DSRD by manufacturers, retailers and logistics service providers as a change management tool. The generic DSRD provides guidance as to the methods and tools to be used for interventions in processes and systems associated with new product introduction, development and delivery

MANAGING BIG DATA IN GENERAL CARGO WAREHOUSES FOR INTERNET OF THINGS PROJECTS

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Purpose

In general cargo warehouses, general cargo is handled manually by industrial trucks. This can give rise to errors in logistical processes, with costs being incurred in the subsequent elimination. Examples include incorrect stacking and storage or loading of packages onto the wrong truck. If digitization in general cargo warehouses were intensified, large volumes of unstructured data would be available that can be processed in real-time. The paper examines how various Big Data concepts and Internet-of-Things (IoT) can be used to detect and report logistical errors while the goods are still in the general cargo warehouses in order to save costs.

Design/methodology/approach

Applied research is chosen as the research methodology. Starting from the reference architecture of NIST for Big Data, the functional areas along the data flow are being examined. Here, special attention is paid to the different types of analysis with respect to use in a general cargo warehouse. Different existing frameworks for the realization of Big Data tasks are described in terms of their properties. Afterwards, a methodology for managing large amounts of data in general cargo warehouses in Internet-of-Things projects will be presented. A selected Big Data framework is evaluated. The results are documented and discussed.

Findings

The result of this study is the proposal of a methodology for the management of large amounts of data in general cargo warehouses in Internet-of-Things projects. Here, the use of a big data framework based on a time series-based database is proposed for the real-time monitoring of logistical processes in a general cargo warehouse.

Value

Scientific literature has so far only contained general suggestions for the use of Big Data and IoT in logistics. What is new in this work are concrete suggestions for the use of Big Data and IoT, using the example of cargo handling in general cargo warehouses. These findings will help operators of general cargo warehouses save costs in their logistical processes

EVOLUTION OF LOGISTICS FUNCTIONS OF E-BUSINESS FIRMS: A FINANCIAL ANALYSIS

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Purpose Recent development of the e-business brings in diversification of way of doing commerce. A distinctive trend is that e-business firms are evolving from non-asset platform businesses to physical asset-based business. This is attributed to strengthening physical logistics functions by in-sourcing the fulfilment process within their boundaries (Yu et al., 2017). As the logistics functions of e-business firms are strengthened, convergence of logistics functions is taking place between e-business and logistics firms with their boundaries blurring. In this regard, the purpose of this paper is to explore how logistics functions of e-business firms have evolved and to examine how convergence between the e-business and the logistics firms is taking place using financial data analysis.

Design/methodology/approach This paper takes a two-step approach: first, in-depth interviews are undertaken to explore the evolution of the logistics functions of the e-business firms; second, clustering is conducted for the e-business and the logistics firms. The clustering uses financial data of the sample firms (Capece et al., 2010). Sample firms are global e-business and logistics firms in the US, China, Japan and Korea, where the e-business and logistics industries are comparatively developed (Terzi, 2011).

Findings Clustering shows that they have the same financial and management structure. It is attributed to the evolution of the e-business firms into firms with functioning logistics activities for their physical assets. The global e-business firms tend to run their own warehouses and logistical assets and provide logistics services under their business boundary.

Value We examines overlapping functions/competitive relationship of the e-business and the logistics firms through result. In addition, it is meaningful to suggest the blurring boundaries and similarities between the e-business and the logistics firms through quantitative analysis. According to the trend in the e-business industry, the e-business firms can be redefined as 'e-business logistics firm' which is a new type of firm. Also, this paper is significant in that it provides a new paradigm for e-business research

IMPACTS OF SUSTAINABILITY PRACTICES ON THE OIL AND GAS SUPPLY CHAINS: NATURAL RESOURCE-BASED VIEW AND INSTITUTIONAL THEORY APPROACHES

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PurposeThe aim of this paper is to conceptualise a structural model of environmental sustainability for the O&G SC. Following the recommendation of Carters and Rodgers (2008) that a conceptual framework should be underpinned by strong theoretical foundation, we combined the relevant elements of the Institutional theory (Dimmagio and Powell 1983) with the Natural Resource Based View (NRBV) of Hart (1995) to depict the roles of regulatory pressures in driving supply chain innovations and environmental capabilities towards competitiveness of O&G firms. This research proposes structural model and relevant hypothesis to delineate the causal relationships among constructs.

Design/methodology/approach This research adopts a theory building approach (Meredith 1983) to develop a conceptual framework of environmental sustainability for the O&G SC. The proposed model is based on a structured literature review which synthesised the extant into four clusters (coercive pressures, resources, strategic environmental capabilities and competitive advantage) that are considered relevant to the objectives of the study within the two theoretical lenses (Institutional theory and NRBV). These clusters were developed into various constructs that made up our model, based on hypothesis developed from the extant literature. Finally, the managerial implications, value and limitations of the study were highlighted.

FindingsIn line with Liang et al. (2007), we found that regulatory pressure is a critical factor in the O&G firm's adoption of environmental practices, hence we depict this as the antecedent of resources and environmental capabilities in our proposed model. We also found that environmental capabilities can enhance the competitiveness of O&G firms. Based on the above, an overarching model of environmental sustainability of the O&G supply chain was developed.

ValueIn the first instance, this paper has contributed to theory building process in the field of GSCM/SSCM by developing a new theoretical model for the O&G SC. Unlike previous models on environmental sustainability in the O&G industry, our study utilised relevant components of existing theories propose a new model of environmental sustainability in the O&G SC. Besides, our model depiction of clean technology as one of the strategic environmental capabilities needed by

O&G firms is very novel in the O&G industry considering the global drive towards clean energy and renewables.

Research limitations/implications Although the model is purely conceptual at this stage, its development have also contributed to theory-based research in the field of supply chain management.

Practical Contribution On empirical verification, this work can furnish the supply chain managers with validated measurement scales to evaluate the strengths and weakness in their supply chain innovation and the impacts on environmental capabilities and competitive advantage. It can also assist policy makers in the O&G industry to evaluate the impacts of sustainability policies on firms' acquisition of strategic resources and capabilities.

COMBATING FOOD FRAUD AND THREAT: A TYPOLOGY AND MANAGEMENT FRAMEWORK

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Purpose The challenge to food integrity posed by food fraud and threat is increasingly recognised (Soon, et al. 2019) and has gained increasing focus from industry and attention from both academic researchers and regulators in recent years. This research explores the level of awareness and practice of key food system stakeholders on the Island of Ireland (IoI) vis-a-vis the challenges presented by food fraud and considers these in relation to approaches and practices in other selected OECD countries. This study aims to: (i) identify the type of food fraud vulnerabilities on the IoI; (ii) identify and evaluate responses undertaken in IoI and in selected countries; and (iii) on this basis develop a typology of vulnerability initiatives.

Design/methodology/approach A survey of food manufacturers on IoI (n=176, 17% response rate) sought to establish the perceived prevalence of food fraud and threat, number and type of incidents experienced, the responses to such incidences and expectations as to future strategies and responses. Semi-structured interviews were carried out with 22 supply chain and wider food system stakeholders on IoI and in the UK, the Netherlands, the USA and Denmark.

Findings The qualitative findings arising from IoI respondents were integrated with the quantitative analysis of the IoI survey data to provide a holistic perspective addressing perception and practice. Analysis of qualitative data arising from interviews with respondents from each of the selected countries supported identification of strategies and practices in each country. A Vulnerability Management Typology classifies strategies as those that are firm/agency centric and those that involve different types and levels of collaboration. A (VMF) illustrates the main elements of strategies that aim to detect, deter and prevent food adulteration/theat. In this context a number of underlying themes are identified. Analysis of these informs strategy design and deployment, including vulnerability assessment and preventative countermeasures.

Value With some notable exceptions (e.g. Fassam and Dani, 2017) few studies of food fraud and threat have adopted a supply chain management perspective. Hence this empirical study complements and builds on previous studies of a more technical nature (e.g. food authenticity testing methods) and from a social

science perspective (e.g. conditions that give rise to fraud/threat based on criminological theories) (Van Ruth, et al., 2017; Spink et al., 2017).

Research limitations/implications This empirical research adds to an emerging literature addressing food fraud/treat.

Practical Contribution A vulnerability typology and a VMF offers guidance to practitioners on strategy and practice.

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PACKED PRODUCT PARADOXES IN GLOBAL FOOD SUPPLY CHAINS: THE CASE OF SOUTH AFRICAN TABLE GRAPES SOLD IN EUROPE

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Purpose
Current literature on packaging logistics acknowledges trade-offs in supply chains for packed products, but it is less effective in explaining the different characteristics of various trade-offs and the complexity of managing these trade-offs. Grounded in paradox theory, the purpose of this paper is to increase the understanding of the role of packaging (systems) in sustainable global food supply chains. To do so, the paper aims to identify and analyse packaging-related paradoxes in global food supply chains.

Design/methodology/approach
A single case study of four companies in a global food supply chain of table grapes from South Africa to Europe was conducted. The data were collected through interviews, observations and archival data. The analysis was supported by a conceptual framework based on paradox theory with four categories of paradoxes.

Findings
The paper identifies and analyses organisational paradoxes related to the fulfilment of product and packaging requirements throughout the supply chain. The paper describes how the four categories of paradoxes have impacts on logistics efficiency (lead-time and costs), amount of food waste and packaging material efficiency (material recycling, material selection and sufficient amount of packaging material) in the supply chain.

Value
The application of paradox theory to empirical data of packed products deepens the understanding of the eco-efficient performance of global food supply chains.

Research limitations/implications
The four categories of paradoxes and their impacts on packaging for sustainable supply chains extend current knowledge about trade-offs in supply chains for packed products. This provides input to understanding the complexity of managing paradoxes. A limitation is that the case study does not cover the companies in the final stages of the supply chain (i.e. retailers and consumers). Another limitation is that the single case study focuses on one packed product. Future cases should complement with other products.

Practical Contribution
The findings provide awareness of packaging paradoxes in global food supply chains, which is a first step in managing the paradoxes. The findings also highlight the need for companies to be transparent and use a system perspective

on packaging selection and development in order to obtain sustainable global food supply chains

LOGISTICS OF TOURISM: A CASE STUDY IN THE SLOVENIAN TOURISM INDUSTRY

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Purpose

The purpose of this paper is to emphasize the significance of the Melania Trump factor in the branding of Slovenia as a tourist logistics destination. Slovenia saw significant mass media attention at the beginning of 2016 when Donald Trump successfully emerged in the American Presidential Campaign.

Design/methodology/approach

The reason that events in the United States affected Slovenia and also a small town of Sevnica located on the banks of the Sava River is the fact that the First Lady of the United States Melania Trump originates from the Slovene town of Sevnica. Slovenia is logistics in the middle of Europe. Thus, Slovenia suddenly appeared in the world's most important media, such as Washington Post, ABC, NBC, CNN, etc, which turned out to be a significant potential for the economic development, especially for the Slovene tourism industry.

Value

Ever since 2016, the number of American tourists in Slovenia has been increasing significantly (according to some statistics the increase of American tourists in 2017 was by 11 % in comparison to 2016). In 2017, the number of all tourist arrivals at accommodation in Slovenia was approximately 4.9 million. This article explores the media representation of Slovenia and some of its influences on the community. The research also indicates the relation between the Melania Trump factor and the development of good logistics in tourism in Slovenia. After increased number of tourists started visiting Slovenia, tourism stakeholders launched new tourism products, among them a new brand called First Lady, which includes local products and specialties, such as beauty creams, bottles of the Blue Franconian wine, tea, pralines, the Sevnica apple slices dipped in chocolate, and cured salami sausages

FIRM SIZE AND PROCESSED SEAFOOD SUPPLY CHAIN MANAGEMENT PRACTICES: INSIGHTS FROM THAI SMES

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Purpose
Supply Chain (SC) practices have seen a shift towards gaining mutual benefits, sustainable practices and competitiveness (Jalalvand et al., 2011). This has led to challenging issues, especially for the food industry, characterised by dynamic and constantly changing customer demand (Ghadge et al., 2017). Processed Food Supply Chain Management (PFSCM) can be defined as all food that has gone through some value addition and may or may not have been through the cold chain based on the nature of the product under Supply Chain Management (SCM) (Mahajan et al., 2017). Additionally, community enterprise is a group of people in the same community that are officially registered to work together to improve their community's economy, emphasizing self-sufficiency rather than profit. In family business, the owners play the main role to enhance competitiveness.

This study focuses on a Thai community enterprise and a household business, which produces processed seafood items (e.g. shrimp paste and fish sauce), comparing SCM practices by using the Supply Chain Operations Reference Model (SCOR Model). Our research question can be identified as "What are the differences between the processed seafood SCM practices of community enterprises and household businesses?"

Design/methodology/approach
A conceptual framework and associated hypotheses were developed. A large-scale survey was utilised for data collection from processed seafood producers. Test statistics (T-test) were used to compare the mean difference between two groups of processed food producers in terms of planning, sourcing, production and delivery. Finally, semi-structured interviews were used to explore a greater understanding of SCM practices.

Findings
The results indicated that community enterprises have a significant higher potential in terms of production and delivery, whereas household businesses performed better than community enterprises in terms of production planning and sourcing. However, in terms of overall SCM practices, the results showed no significant difference between the community enterprise and household business.

Value
Past research (e.g. Ghadge et al., 2017; Mahajan et al., 2017) has identified the challenge and importance of food SCM, especially in small and medium-sized enterprises. Our study provides empirical based evidence, using an explicit comparison of processed seafood SCM practices between community enterprises

and household businesses by using the SCOR model, providing a deeper understanding of SCM practices for processed seafood. Therefore, the findings should assist both community enterprises and household businesses to implement more efficient processes, leading to higher performance.

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DECISIVE ENGAGING FACTORS IN CROWD LOGISTICS: THE CASE OF CHINA'S TAKEAWAY/HOME DELIVERY INDUSTRY

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PurposeCrowd logistics (CL) is an information connectivity enabled marketplace concept, that matches supply and demand for logistics services with an undefined and external crowd that has free capacity with regards to time and/or space, participates on a voluntary basis and is compensated accordingly (Rai et. al., 2017). CL enables enhanced utilization of excess capacity in term of both time and resources such as private use of one's time and vehicles to deliver goods or services (Marcucci, 2017). While ubiquitous inexpensive technological factors and decent financial returns for private agents influence the growth of CL, very little is known about the key factors that impact on attraction and/or retention of private agents in CL other than financial returns. This is perhaps not surprising given the very limited studies dedicated to CL so far (Rai et al., 2018). Hence, this study examines the role of crowd logistics (CL) in takeaway/home delivery service in the context of food industry in China. A decision model is also proposed to help the decision makers understand the issues in CL holistically in the context of takeaway/home delivery services.

Design/methodology/approachA particular business sector currently experiencing rapid increase in the utilization of CL is online takeaway/home food delivery service; the focus of this study. Market report on takeaway/ home food delivery in 2017 indicates the revenue generated in the food delivery segment globally amounts to US$72.9 billion in 2016, with China as the world's biggest takeaway/home food delivery market with a revenue of US$29.8 billion in 2016 (Statista Digital Market Outlook, 2018). We empirically examine the factors that influence private agent participation (attraction and retention) in CL in the context of takeaway/home delivery food market in China. We identify key motivations for web-based self-enrollment by private agent, the enabling skills and perceived risks associated with participation in takeaway/home delivery service. Using Structural Equation Modeling (SEM) technique, we quantitatively explore the relationship among four factors on participation such as capability, attractiveness and perceived risk associated with delivery services by private part-time agent.

FindingsThis study finds that the relationship between capability and attractiveness is positive and strong, whereas risk and attractiveness is very weak but positive. Also, it is evident that the main reason for joining CL is for most private agents is the potential for career development rather than economic benefit. In other words, financial benefits and the usage of free time matters less to those investigated. Attractiveness to CL is significantly increased

when delivery agents see a clear work-life balance in their tasks as part-time workers.

ValueThis research work contribute to the CL literature from yet another perspective of theory building in the field of human relation, more specifically on employer/employee relationship in current business environment where mobile or temporary workforce becomes predominant. As industries experience the paradigm shift from mostly permanent workforce to mobile/temporary workforce, it is necessary to reengineer the corresponding theory in Human Relationship Management (HRM). Beck (2003) presented independent workforce theory as a more generalized one But, the need of the hour is to develop a human relationship theory that exclusively represent today's service sector. Such type of study will surely improve the understanding of perceptions of both employee and employer and enhance common objective of customer satisfaction.

Research limitations/implications The study is based on Chinese data set of home food delivery and this could be extended to other emerging economies and industries

Practical Contribution Decision model proposed will enable decision makers to understand the core issues in CL and how such issues affect the voluntarily participation in CL activities

CREATING VALUE FROM RETURNS BY CLOSING THE INFORMATION LOOP: A SYSTEMATIC LITERATURE REVIEW

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Purpose
Product returns contain a substantial amount of valuable information within them (Schenkel et al., 2015). However, organizations both undervalue this information (Krikke et al., 2013) and are struggling to create value from it (Röllecke et al., 2018). While research exists, it is scattered among various research stream making it hard for practitioners to utilize it and for researchers to systematically built upon it. Therefore, the aim of this literature review is to understand how organizations can utilize information embedded in product returns for value creation.

Design/methodology/approach
We conduct a systematic literature review, bringing together relevant research from multiple streams of research. More specifically, this research reviews the literature on circular economy, reverse logistics, closed loop supply chains, and product returns management that focuses on information systems, knowledge management, organizational learning, and information sharing. Content analysis is conducted on 57 papers.

Findings
The findings of this study confirm the importance of information systems and their management in a closed loop supply chain. Nonetheless, businesses cannot simply invest heavily in information systems and hope to reap the rewards from product returns information. Rather, focused investments with overall goals in mind should be emphasized. Moreover, this research shows the potential of learning and knowledge management processes and the potential of technologies such as RFID tags and data mining in a closed loop supply chain context.

Value
This is the first literature review that systematically brings together and synthesises relevant research works on how to create value from product returns information. The main contributions of this literature review are to clarify the current knowledge on this topic, to form a basis upon which further empirical work can be built upon, and to identify gaps in the extant literature thus paving way for fruitful avenues of research.

Research limitations/implications
Relatively small amount of research has been carried out regarding this topic. Much of the research has focused on technological and operational issues. However, the potential benefits of returns information go beyond operational

issues and creating value from this information requires more than technological solutions. Therefore, more research drawing from organizational learning theories and strategic management theories are required to shed light on how firms can utilise returns information for continuous strategic learning.

Practical Contribution
The main practical implications of this research come in the form of a starting point for practitioners for thinking about implementing practices and processes aimed at creating value from returns information. Moreover, this research highlights the strategic potential of product returns information.

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A SUPPLY CHAIN VIEW OF ADDITIVE MANUFACTURING BUSINESS MODELS

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PurposeTo provide a scientific analysis of growth prospects in Additive Manufacturing (AM), in particular to propose a model for market size estimation taking uncertainty into consideration and a model of key processes and stakeholders in an AM supply chain.

Design/methodology/approach This research is based on a quantitative analysis of publicly available market growth estimates and an extensive review of literature on existing supply chain business models (e.g. Deloitte, 2019; Durach et al., 2017; Rogers et al., 2018). The proposed model was pre-tested, using opinions and insights from three business managers.

FindingsAlthough the AM market is growing rapidly, our estimates indicate that hype currently greatly exceeds reality. Further, traditional manufacturing through established supply chains will maintain its dominant role for the foreseeable future. Assessment from three business managers working with AM products reveals that our proposed model is potentially useful when mapping out the AM supply chain landscape.

ValueA sequential view of key aspects of the AM supply chain building upon previous literature and experts' insights is proposed for the first time.

Research limitations/implications First, as market estimation methods vary, the results contain a certain degree of uncertainty. The calculation methods should be expanded to allow for market segmentation. Second, the model of key processes in the AM supply chain should also be considered dynamic, owing to market fluctuations and technological developments, based on specific business cases. Therefore, additional testing and judgements from experts are required.

Practical Contribution First, the market analysis method provides a basis for estimating AM market growth potential, which is an essential decision-making tool for practitioners. Second, the AM Value Chain model provides a basis for the analysis of key market players and opportunities for value creation, especially in certain section-specific applications.

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3D FOOD PRINTING IN EUROPE: BUSINESS MODEL AND SUPPLY CHAIN ASPECTS

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Purpose3D food printing is an emotive and interesting business proposition that has caught the attention of the media, as well as the imagination of entrepreneurs. Several 3D food printers are now commercially available but are currently primarily used for niche applications such as printing bakery decorations, to make easy to eat meals for patients with chewing/swallowing conditions and for 'pop up' restaurant meal experiences. Indications are that the next few years are likely to bring newer, more mainstream applications, processes and materials (Brunner, et al., 2018; Dabbene, et al., 2018).
This paper reports on a study that conducts a comparative analysis of consumer and companies' expectations for the future development of additive food manufacturing in Europe. More specifically, with a focus on business model and supply chain implications, the project goals were to identify use cases of 3DFP in European and especially German-based companies; gauge consumer perception of- and interest in 3D printed food and evaluate risks and opportunities.

Design/methodology/approach The study involved a) analysing the websites of existing and developmental 3DFP firms b) conducting semi-structured interviews with managers (from both 3DFP and food engineering firms) and c) carrying out an online consumer survey to gauge consumer appetite for 3D printed food. This information was then analysed in terms of the implications for business models and supply chain configurations (Braziotis, et al., 2019; Rogers, et al., 2016; Rogers, et al., 2018).

FindingsThe consumer survey was answered by 200 respondents from 23 countries. The key findings were that 3D printed food is currently not perceived as something suitable for everyday life (indeed over 50% are unsure how they feel about 3D printed food) but rather better as 'decoration' or as a product for people with special nutritional needs. The main risks and challenges identified by discussions with the 3DFP and food engineering managers were; technical feasibility, customer perception, production time (duration) and total supply chain cost. The biggest challenge is the need to clearly identify the market. Layered food manufacturing is such a novel technology that it is necessary to demonstrate its value and ease of use to convince customers of its potential.

ValueThe burgeoning interest in 3DFP (e.g. number of journal articles and online content) indicates the business potential of this technology. By analysing market data on 3DFP investments and current academic literature on applications of the technology and associated business models, we provide a useful overview of potential future developments and expectations in this field.

The inclusion of opinions from both industry experts and consumers ensures relevance.

Research limitations/implications One of the most important challenges of the research is that 3DFP is in the very early stages of commercialisation. This makes market data difficult to verify. However, now is the time for emerging 3DFP companies to determine what their business models and in particular, what their supply chains should look like, making this research timely

INTERORGANISATIONAL DYNAMIC CAPABILITIES IN SUPPLY CHAINS – A CONCEPTUAL FRAMEWORK

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Purpose
In recent years logistics scholars have stressed the need for interorganisational collaborative development as a means to sustain the competitiveness of a supply chain. Existing literature is fragmented and there is a need for further categorisation and systematisation on how to create, extend and modify resources in a supply chain. Dynamic capabilities theory constitutes a promising ground for such a development. The purpose of this paper is to present a systematic literature review on existing interorganisational dynamic capabilities and propose a conceptual framework of these at different hierarchical levels.

Design/methodology/approach
Based on an initial article screening and the development of a tentative conceptual framework, a search string was constructed to cover existing literature regarding interorganisational DCs. A systematic literature review approach was followed, which rendered 36 articles that were included in the review results. The review results were several, but are in this paper limited to a thematic presentation of (1) antecedents to interorganisational DCs and (2) classes of interorganisational DCs. The result from the review was thereafter reflected against the developed conceptual framework as a means to further develop and characterise the different levels included in the framework.

Findings
Antecedents to interorganisational DCs are presented, as well as different types of DCs in a framework, consisting of the levels ecosystem capabilities, firm-based network capabilities, firm-based exploitation of external capabilities, and internal capabilities.

Value
Dynamic capabilities exist in parallel at different levels ranging from individual companies to wider networks. To identify the relevant levels, and categories of dynamic capabilities at the different levels, constitutes an important foundation for future research in dynamic capabilities theory in general, but it also serves as a platform for future logistics research. The conceptual framework elaborated in this research is a first attempt towards such understanding and knowledge building.

Research limitations/implications
In order to limit the scope of the presented literature review, only papers explicitly discussing DCs have been included. Issues regarding joint collaborative development in a supply chain can however be elaborated from alternative

viewpoints. Future research should therefore include additional theoretical lenses.

Practical Contribution
An understanding and categorisation of interorganisational DCs is believed to be an important step towards an understanding for how to improve collaborative efforts in a supply chain

TOWARDS POSITION-BASED TECHNOLOGIES FOR DIGITIZED PROCESS MANAGEMENT ON THE SHOP FLOOR

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Purpose
Position-based technologies (PBT), e.g Ultrawideband (UWB), WiFi or Bluetooth, for indoor localisation purposes are already commercially available. With the highly increasing digitalization of industrial processes, the potential of these technologies comes into focus of process management research. This paper aims to structure position-based technologies according to their potential to support shop-floor process management. For this purpose, a framework with the following dimensions is developed: technologies, application features, use cases and data accumulation. Furthermore, the idea of using position-based data to improve process mining is presented.

Design/methodology/approach
A comparative analysis is used to cluster the available indoor positioning and tracking technologies according to performance features such as accuracy, integration effort or range. As indoor positioning and tracking technologies have not yet found widespread application on the shop-floor level, the paper proposes a framework in form of a multi-dimensional matrix linking common tasks in assembly and logistics processes to suitable PBT applications. The framework also addresses data accumulation, conversion and structuring strategies for real-time position data that can be used to support process optimization, or even to identify and design initial processes by process mining.

Findings
The findings of our work are a generalized framework, which facilitates the selection and application of indoor positioning and tracking technologies for shop-floor processes and suggests strategies to aggregate position data for business process engineering and optimization. A UWB use case is presented to demonstrate the application of the framework.

Value
The paper presents a new approach to systematically relate position-logging technologies, their specific features and data accumulation strategies to common shop-floor use cases. The paper also shows how position data can enrich event logs for process mining activities.

Research limitations/implications
The contribution is a conceptual paper. In further research, the framework needs to be evaluated in case studies. In its current form, the framework is limited to

discrete manufacturing. Further research also must be done in the field of consistent IT-system integration from shop-floor to ERP level.

Practical Contribution

Usually, process optimization uses event-based data (e.g. from ERP or WMS systems). Based on the framework that is developed in the paper, position-based data can be used to enrich process optimization bottom-up.

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THE ROLE OF COLLABORATIVE NETWORKS IN OVERCOMING ADOPTION CHALLENGES OF 3D PRINTING

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PurposeLimited research explores the role of different types of collaborative networks, i.e., cluster-based, academia, or industry-led in addressing challenges and barriers in adopting 3D printing. The literature on the adoption of new technologies focuses on the intra-organisational enablers and to a limited extent on the role of external partners. Hence, this paper explores the role of collaborative networks in overcoming adoption challenges of 3D printing.

Design/methodology/approach The exploratory interview and case study approach employed here identifies companies' challenges in adopting 3D printing. The interview questionnaire caters to research gaps identified in the literature review and is used to conduct semi-structured interviews with firms adopting 3D printing. The research design includes interviews with three service providers and seven customer firms (three in Denmark and four in Germany) between January and May 2017.
The design also includes interviews with one Danish and two German 3D printing networks combined with public domain information (websites, etc.). Nexttech in Denmark is an industrial cluster, while 'mobility goes additive' in Germany is an industry-led consortium, with universities added as academic members. The University of Paderborn Direct Manufacturing Research Center (DMRC) is a university-led consortium that also has industry partners.
The research team recorded, analysed, and shared the interviews with the participants.
The theoretical lens in the paper includes co-opetition, technology dispersion and adoption theory, and ambidextrous network theory.

FindingsNetworks provide solutions for challenges not addressed by individual service providers. The findings illustrate that networks serve as a platform to discuss and share best practice on challenges such as lack of 3D printing technology awareness in the procurement function, how to train strategic buyers on the technologies, and in developing a customised Total Cost of Ownership (TCO) analysis for 3D printing for their requirements. Networks also liaise with industry associations and regulatory agencies for creating industry-specific standards and addressing IPR-related issues. An academia-led network that

allows industry partners to initiate research projects provides a balance of creativity network, transformation network and process network characteristics.

ValueThis research clarifies the role and contributions of networks in overcoming challenges in the adoption of 3D printing from exploration to exploitation – an important issue largely neglected in the literature and highly relevant for industrial companies.

Practical Contribution There is a clear need for organisations across the 3D printing spectrum to develop a collaborative platform to share challenges and develop solutions, which also facilitates the further development of the technologies. A group of companies can drive these, including both users of the technology, raw material and equipment suppliers, service providers and also educational institutions (e.g. 'mobility goes additive'). Such networks can also be operated as an independent entity as an industrial cluster based organisation (e.g. Nexttech) or led by universities (e.g. the University of Paderborn DMRC), bringing in companies to test the latest developments and to train engineers and executives

ON CONSIGNMENT SALES FOR ITEMS WITH A SHORT SELLING SEASON

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Purpose
The purpose of this paper is to study the effectiveness of the consignment sales contract between the retailer and the manufacturer. The research intends to show how profitability and service level can improve both locally and globally through collaboration when supplying products with a short selling season. In particular, the paper aims to establish supply chain settings with respect to demand variability and cost structures under which consignment sales could be beneficial for stakeholders.

Design/methodology/approach
The paper builds on the newsvendor model to develop the optimal consignment sales policy in which the consignor (manufacturer) places the product at the consignee (retailer) to gain greater exposure to the market, whereas, the consignee physically stores the product and pays the consignor only upon the sales of the product. Using the traditional newsvendor model as the base case, this research conducts numerical experiments for sensitivity analysis as well as compares its results with the well-established optimal return policies proposed by Pasternack (1985) to assess the effectiveness of the consignment sales contract.

Findings
Analytical results for the consignment sales contract indicate that the optimal consignment stock is primarily contingent on the cost of goodwill and the commission rate to be negotiated between the parties. Further, initial results of the numerical experiments reveal that the higher the demand uncertainty, the lower the optimal commission rate determined for the overall system.

Value
The vast majority of existing literature on vendor-initiated replenishment is focused on the research of vendor-managed inventory. In comparison, the study of the consignment sales has been rather limited. Considering the fact that the consignment sales contract holds greater relevance for new products (uncertain demand with no sales history), seasonal products, or perishables, this paper contributes in filling research gap by identifying incentive aligned collaborative initiative via use of the newsvendor approach.

Research limitations/implications
Although this paper provides valuable insights on the benefits of the consignment sales, its structure of single retailer – single supplier can be considered a limitation. An extension for future research direction, thus, includes the study of the initiative under multi-retailer setting. Also, incorporating the impact of supply-side disruption should provide a relevant and interesting research avenue.

Practical Contribution
Assuming no legal ownership of the product and merely acting as the agent of the consignor, the consignee minimizes the financial loss from capital investment

or the risk of overstocking under high demand variability and a short selling season. Further, consumers benefit from such an agreement as product availability improves as a consequence of the collaboration between parties.

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EFFECT OF INDUSTRY DIMENSION ON MANAGING THE GLOBAL SUPPLY CHAIN RISKS: A PROFILE DEVIATION APPROACH

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PurposeThe primary purpose of this paper is to provide an in-depth analysis of the effect of the industry dimension on global supply chain risks management. Although there have been many articles discussing global supply chain risks and their mitigation strategies, there has not been much insight into how different industries tackle different global supply chain risks while internationalizing abroad. We believe that each industry has a particular context; therefore, global supply chain risks and its mitigation strategies would differ as per industry context.

Design/methodology/approach We have used profile deviation and ideal profile methodology to identify top performers in each industry segments and evaluated their best practices to deal with global supply chain risks. We have utilized online survey methodology to get a deep insight into how Indian executives across various industries manage 11 different global supply chains risks during their internationalization process.

FindingsThe findings of this study would extend the existent knowledge on global supply chain risk management practices. The literature provides contradictory results on why and how specific global supply chain risks management practices works in one industry context than others. We aim to provide a clear understanding of why particular risk mitigation practice works well in some industry but not for another industry segment. Consequently, we intended to further extend the existent knowledge of global supply chain risk management practices.

ValueOur findings aim to provide new insight for practitioners and researchers alike. The results may serve as a useful tool for prospective Indian executives planning to internationalize their venture. We believe that based on our results, executives can plan and execute their international undertaking well by mitigating various global supply chain risks across industries. Similarly, we think that our findings would extend the theory development of global supply chain risk management practices.

Research limitations/implications The present study mainly deals with the Indian executive; therefore, the findings may not be generalized in another country/institutional context

MULTI OBJECTIVES LOCATION ALLOCATION MODEL CONSIDERING PROVIDER'S SATISFACTION FOR MOBILITY SERVICE

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Purpose
Recently, Sharing Economy is obtained with much attentions including mobility service. To operate the service, balance among cost, customer satisfaction and provider's satisfaction becomes important to achieve high market share. Namely, low operation cost provides lower fare for the service. And high customer satisfaction provides more frequent request. Not only these traditional aspects but also service provider's satisfaction will be affect performance of the sharing economy because enough server is necessary to continue service. We propose multi objective location allocation model for mobility service including provider's point of view. The model is implemented in Genetic Algorithm based method to solve. For evaluation, we have focused on replacement driver service in which replacement driver taking steering wheel instead of especially drunk driver to take he and his car to the home. We one-year operation data obtained from actual replacement driver service company.

Design/methodology/approach
The service is not included in Sharing Economy but some characteristics are common with Sharing Economy service. First, we formulate two objectives Location-Allocation problem in which one objective function corresponds to reducing total travel distance, i.e. cost reduction, and the other one corresponds to load balance among drivers, i.e. provider's satisfaction. Here, Location Allocation problem of facility problem is a problem to obtain the optimal facility location to minimize total distance among the facility and demand points. We have carried out series of Numerical Experiment to evaluate performance of proposed model.

Findings
According to the series of Numerical Experiment, our proposed method obtains about 10% better allocation compared to manager of actual replacement driver service company. Here we achieve higher balance among drivers compare to actual one. Through the approach, we present that our solutions provide both traditional goal and a new goal considering provider's satisfaction.

Value
In this paper, we have proposed a new objective, e.g. provider's satisfaction, in mobility service. Using Genetic Algorithm based methodology, we obtain much better solution considering such aspects compare to outcomes in actual

company. The method can be applicable such business. And also, with our proposed model and numerical experiment, we provide a new research problem that manager of mobility service should consider objectives to maintain.

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LIFECYCLE-CENTERED STRATEGY EVOLUTION OF COMPANIES ALONG THE VALUE CHAIN; COMPLEXITY AND ADAPTIVE BEHAVIOR

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Purpose
This is a conceptual paper about the lifecycle. The lifecycle explains and predicts much about market and firm behavior and does it symmetrically in time. It will forecast the future and explain the past. Most of the firm's internal functions can and have been mapped along with the evolution of the market from effectiveness to efficiency zones and the rise of platforms such as standard settings and value chains. In addition, the explanations correlate with the developing strategies of the firms. Nevertheless, in the age of time-based competition (especially of high-tech products and services) we find a market nonlinearity, due to increasing network complexity, which creates an edge of chaos zone. To overcome this problem, new emerging platforms appear which enhance market survival and defend against further intrusions into the market by competitor value chains. These platforms of standard setting along the value chain join forces and reinforce the firm's ability to adapt to the transition from effectiveness to efficiency zones. Furthermore, the firm's own structure continues to evolve to meet these new efficiency demands.

Design/methodology/approach
The paper is based on literature review and examines the above questions on a strategic level. In the literature review, academic articles were used together with other literature such as reports prepared for policymakers and industry associations and reports prepared by consultants. The Scopus database and Google Scholar were used to identify articles and reports with key words.

Findings
This paper will provide the explanatory framework from a complex systems perspective of customer segmentation over the lifecycle as managing the "effectiveness" versus "efficiency" zones.

Value
The paper further examines the learning process under complex conditions based on the analogy of two "climate zones".

Research limitations/implications
This paper is about progress in theory and recognizes that sound theories, the kind that explain predictably, what will cause to happen does not develop overnight. Even if a theory does not explain some particular application, it's still

valuable because knowing when a particular theory doesn't help elucidate something will allow you to turn to others to find a better answer. That's the hallmark of a good theory. It dispenses advice in if-then statements (Christensen, Hall, Dillon, & Duncan 2016).

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IMPACT OF PRODUCT RETURN POLICIES ON REVERSE LOGISTICS MANAGEMENT IN OMNICHANNEL RETAILING

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Purpose

Current research and contemporary business practices on product returns management predominantly focus on products returned exclusively through either brick-and-mortar (or offline) or online sales. Comparatively less attention has been given to products returned from omnichannel retailing, a multi-channel retailing practices, which has changed the structure of the supply chain (Wollenburg et al., 2018).

As more businesses embark on omni-channel retailing, options for product returns have become essential thus, the integration of return management has also become critical (Bernon et al., 2016). The multitude of options offered by omnichannel retailers for product(s) return could have significant implications on the management of reverse logistics activities such as post, stores, and drop-off points for return (Saghiri, Wilding, Mena, Bourlakis 2017).

This paper examines the operational impacts of alternative product return policies (terms and conditions) offered by omnichannel retailers on product returns management.

Design/methodology/approach

Through a review of the product return policies (and logistical options) published on the websites of 14 omnichannel retailers having a brick-and-mortar presence in Australia, this study develops a taxonomy of product return options to serve as a base for a followed-up scenario analysis. The review focuses on the return of high-value products (e.g. smart devices) to contrast their reverse logistical implications due to the size of the two types of products. The scenario analysis explores the range of reverse logistical activities and product handling processes incurred resulting from each of the product return options to assess their operational impacts.

Findings

This study assesses the reverse logistical implications of various options of product returns policies in terms of the points of return, the sorting and inspection processes involved, the mode of transport used, and the plausibility of resale, either as is or with modification, or other forms of disposal. It found that, in general, companies that provide comprehensive return options will need to design robust processes, that promotes closed loop supply chains. Efficient and effective closed loop supply chains allow the companies to reduce costs and quickly capture value associated with return goods, resulting in a higher level of reuse and recycling. The logistical and distribution networks involved in closed

loop supply chains needs to be agile to cater for the variability of returns, and yet minimise resources.

Value

Using a scenario analysis, this study unwraps the complexity of the reverse logistical operations stemming from alternative product return options offered to the purchase of two specific high-value products in an omni channel retailing environment. It brings to light the reverse logistical costs associated with the offering of various product returns options commonly offered to prospective purchasers of these two products.

Research limitations/implications

Within the context of an omnichannel retailing environment, this study provides insights into how reverse logistical processes may have to be organized according to the product return options offered to achieve cost-effectively. However, this study is based on desk research, where information on product return options are sourced from publicly available company web-sites. The assessment of reverse logistical operations associated with different product returns options lacks empirical support. The next step of the study would require an in-depth multiple case study of omnichannel companies in managing their product return logistics.

Practical Contribution

In a rapidly changing omnichannel environment where retailers continue to offer flexible returns policies, and convenient return options, as a competitive weapon to attract consumers, findings from this study offers valuable insights on the cost implications of offering flexible return options to attract sales. It also reminds omnichannel retailers to be wary of the cost-to-serve their flexible product return options and the need to appropriately factor these costs into their business costs and price of sales.

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SUPPLY CHAIN EMERGENCE: A RECONCEPTUALISATION AND EVIDENCE FROM PRACTICE

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Purpose

Complex systems research in supply chains argue that supply chains can demonstrate dynamic, nonlinear, emergent and self-organizing behaviours (Choi et al., 2001; Surana et al., 2005). These behaviours are suggested to be a consequence of an aggregation of multiple diverse system agent interactions driven by individual behaviours, decisions, choices, mental models and beliefs. Although, supply chain complexity commits to the existence of self-organization and emergences, but unlike the complexity research in other organizational science domains like leadership (Lichtenstein and Plowman, 2009), entrepreneurship (McKelvey, 2004) or new product development (Mccarthy et al., 2006), supply chain complexity research fails to clearly conceptualize emergence from a supply chain perspective. Current conceptualization of supply chain emergence and self-organization takes a restrictive view at the phenomenon and fails to recognise it beyond structural evolution or rearrangement. Existing supply chain research also falls short of providing empirical evidence of self-organization and emergence in a real world scenario. The aim of this study is to explore a holistic conceptualization of self-organization and emergence, that looks beyond its current unitary view of structure. This will be done using the following research question; What constitutes of supply chain self-organization and emergence?

Design/methodology/approach

This paper qualitatively investigates 167 cases of supply chain disruption from 21 firms. Data is collected using a systematic data collection method similar to Repertory grid interview technique. The data is analysed using a modified grounded theory qualitative enquiry framework known as Gioia methodology.

Findings

Self-organization and emergence refers to change and supply chains facing disruptions were found to have changed and emerged in four different ways; (i) structural change, (ii) change in established processes or procedures; (iii) change in agent behaviour and (iv) change in organizational goals and priorities. These changes were found to have emerged by multiple, micro level, agent interactions and thus suggestive of them being complexity driven instances of self-organization and emergence. The findings also revealed that these patterns

were not enforced top down, rather they evolved bottom-up; reinforcing the complexity view.

Value
The research provides empirical evidence to argue that it is necessary to re-conceptualize self-organization and emergence in supply chain beyond structural changes.

Research limitations/implications
By recognizing the emergence of complex self-organized order through multiple agent interactions, firm can achieve higher level of innovativeness and resilience to turbulent and chaotic complex scenarios.

Practical Contribution
Organizations have already accepted supply chains to be complex but recognizing emergence and self-organization to have dimensions beyond structural changes, such as change in processes and behaviour of the agents, could provide them with a new mechanism of embracing change.

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IMPLEMENTING ASSOCIATION RULES FOR RACK REPLENISHMENT IN KIVA SYSTEMS

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PurposeKiva robots system is considered as the 8th generation of warehousing picking system by Amazon. The system utilizes Kiva robots to move racks to picking stations to realize goods-to-man picking operations and can save 2/3 of manpower in picking operations. One of the ways for efficient operations of the system is to have the right assortment of goods on racks to reduce the number of rack moves for completing customer orders. This research looks into correlations of customer orders to study the goods allocation plan on racks that could effectively reduce the number of rack moves for shorter order completion time and less man-power used in picking operations.

Design/methodology/approach This study aims at finding goods allocation plans considering correlations of customer orders for efficient picking operations. In calculating the correlation between and among orders, we used Apriori association rules to compute the support and confidence of order items. We generated three batches of 10000 orders with VBA, each referring to an EC company. We later implemented ABC classification and association rules to conduct different levels of order analysis. Considering put-to-light picking systems as in the Kiva systems, the correlations of order items and customer orders were computed with R programming software. The performance measure is the number of times to move racks to complete the customer orders. Different replenishment strategies for goods allocation on racks using product correlation values and order quantity ratios were implemented with simulation to find the optimal replenishment strategy.

FindingsWe performed nine replenishment strategies and found that the best strategy among the nine could reduce the number of rack moves by 77.9% when compared to the randomly allocated strategy.

ValueDespite the growing application of Kiva systems in warehousing operations, there is only few studies look into operational improvement problems. This paper lies its originality in using association rules for rack replenishment strategy for efficient picking operations. The result show tremendous improvement in performance measures, which demonstrates the value of the paper

A TRANSFER HUBS LOCATION OPTIMIZATION MODEL FOR ELECTRIC POWER LOGISTIC NETWORKS IN TAIWAN

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Purpose
Increasing integration of transport resources and transfer hubs location management is a valuable approach toward achieving efficient, reliable, flexible, and sustainable logistics. Optimal transfer hub locations of the studied multi-commodities freight networks will be conducted in this study, while also considering the nonlinear-based transportation fare schemes.

Design/methodology/approach
This paper specifies a mixed integer nonlinear programming problem for assisting electric power system operators in Taiwan with transfer hubs location decisions in minimizing freight shipping costs.

Findings
Different constraints and various objectives will be examined in this study. The study aims to develop a network re-engineering plan for decision makers determining the potential hub locations.

Value
In order to improve the system logistics performance (in terms of transportation shipping tons, ton-miles, and/or costs) of existing electric power logistic networks in Taiwan, the study aims to provide a hub optimization model to assist network re-engineering

NETWORK VALUE CREATION IN DIGITALIZED SUPPLY CHAIN PROCESSES

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Purpose
New technologies are changing the way traditional manufacturing businesses and supply chains operate. The implementation of new digital technological innovations has crucially impacted the interorganizational supply networks. Especially in the fields that are considered more traditional and rigid by nature (e.g. some parts in logistics, machining, energy) have experienced great difficulties in defining the overall change and its consequences to their supply network. The value creation in digital supply chain processes requires a holistic approach in order to understand the value of the new technology. This paper illustrates the value of digitalization in different processes in the supply chain.

Design/methodology/approach
This study aims to explore the value from digitalization in supply chain processes using both supply chain and value network theories to the new technology adoption in supply chain context. The empirical part of the study relies on analysing survey data from 101 companies which investigates the value from digital processes in supply chains. Numerous sources found from the literature are used to gain a holistic understanding of the attributes and impact digitalization change the value creation. Value network literature from the innovation and supply chain management perspectives are used to understand the linkages between organization and the adaptation of the integrated digital processes.

Findings
This study provides an important, yet sparsely addressed viewpoint to the supply chain management literature by illustrating how digitalization impacts supply chain performance and customer benefits. The findings of the paper suggest that digital technologies will impose drastic changes to the supply chain management where creating customer value will become increasingly integrated and networked process. The findings suggest that increased integration and information exchange in the network interactions between organizations can enable combining of the independent business models into a networked business model.

Value
This paper contributes to the both supply chain management and value management literature with insights into how networked digital solutions impact and transform the processes in the supply chain. Analysing the dynamics of the value creation can provide crucial information, thus enabling better value creation and more efficient and effective implementation of new digital technologies in the supply chain. The results illustrate the bottlenecks of

implementing new digital technologies in supply networks, and give insights how to manage the changes in the network context.

Practical Contribution

The study helps to understand the nature and dynamics of value in the supply chain and how digitalization impacts the supply chain processes. The presented view offers insights for utilizing new digital information exchange technologies and evaluating the benefits from investing into the digital technologies in the supply chain

RISKS OF INDUSTRY 4.0 FOR LOGISTICS – A SYSTEMATIC LITERATURE REVIEW

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Purpose
The prospective digitized industrial value creation, also called Industry 4.0, leads to numerous advantages in the logistics sector, through applications such as tracking of products and automatic re-ordering (Kagermann, Wahlster & Helbig, 2013). Despite these advantages, studies have revealed downsides of Industry 4.0, such as excessive data traffic or gaps in the IT security (Barreto, Amaral & Pereira, 2017). However, risks affect different areas of a company while their impact differs among the companies. So far, the literature lacks a holistic overview and framework to describe Industry 4.0 risks (Schneider, 2018). Thus, our study analyses which risks emerge from Industry 4.0 for logistics. The aim of this paper is to detect and classify the risks of Industry 4.0 into corresponding dimensions, to highlight the challenges of these risks for logistics, and to indicate measures to cope with them.

Design/methodology/approach
In order to achieve this research goal, we conducted a systematic literature analysis/review. This method is an adequate and transparent method to analyze and present the current state of research of this defined field. Following common research practice, the following steps were taken during the analysis: definition of the research period, selection of databases, selection of publication types, selection of relevant papers and categorization of papers.

Findings
By analyzing the existing literature, 69 relevant papers from academic databases were identified. Five risk dimensions of Industry 4.0 could be derived from these publications having a direct impact on logistics: human factor, IT security, organization and implementation, data analysis and legal issues and standards.

Furthermore, our study exposes characteristics of these dimensions as well as challenges for logistics.

Value
To the best of the authors' knowledge, this is the first paper to provide a holistic overview of the risk dimensions of Industry 4.0 in the context of logistics. In addition, the study provides measures how companies can cope with the risks.

Research limitations/implications
Our study contributes to the academic discussion in this research field and helps to understand the risks of Industry 4.0. Future research can shed light on the interdependencies between the risk dimensions and their impact on future value creation.

Practical Contribution
Firstly, the identified risk dimensions and their characteristics within the framework are a guideline for practitioners to be able to understand and classify the risks of Industry 4.0. Secondly, risk management departments in corporate practice can use the findings as a basis for their risk assessment. Thirdly, the logistics departments of companies can use this paper to adjust their logistics processes and accordingly take measure to protect them.

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A STUDY OF COMMUNITY-BASED INSTANT MOTORCYCLE DELIVERY SERVICE MODEL FOR LONG-TERM CARE

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Purpose

Facing the challenges of serving aging society, the government of Taiwan promoted the Long-term Ten-Year Plan 2.0, which is a community-based plan to classify diversified services contents. Among those community services, the food delivery service belongs to the immediate needs of the elderly in a long-term care policy. However, the food delivery service for elderly is a missing piece in the whole long-term care picture. This study provides an effective solution to deliver food for elders.

Design/methodology/approach

A genetic algorithm is adopted to dealing the assigning and routing problems in this study. The objective is to provide the service with minimum transportation cost.

Findings

A mathematical modelling framework for elderly's food delivery by motorcycle is proposed. Numerical examples are tested to verify the performances of this proposed food delivery system.

Value

The food delivery for elders has characteristics of instant delivery, small quantity, narrow time window, short delivery distance, and flexibility of delivery equipment. Motorcycles have high mobility, good efficiency, and advantages for moving around the complex urban road system. This study proposes a community-based instant motorcycle delivery service model that satisfies requirements of Long-term care.

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AN INSTANT MOTORCYCLE PICK-UP SERVICE MODEL FOR PHYSICAL RETAILING STORE COMBINED E-COMMERCE ON BUSINESS AREA

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Purpose
In the urban business area, physical retailing stores such as electrical appliance stores and clothing are the core of prosperous commercial districts. As the operating costs of the stores increase, the e-commerce changes both the retail business model and consumption habits. Physical retailing stores are no longer able to meet the customer's shopping needs. By analyzing the difficulties faced by physical retail stores and the advantages of E-commerce operations, an online to offline integrated mode (O2O) is proposed.

Design/methodology/approach
This combinatorial optimization VRP problem is solved by the Genetic Algorithms. This model is designed with the characteristics of motorcycle logistics.

Findings
A new motorcycle logistics would help physical retailing stores taking the advantages of e-commerce and also maintain the instant pick-up service. Through the first mile distribution environment in the business area with the limitation of the carrying capacity of the motorcycle, this study shows the motocycle logistics would reduce the labor cost of the courier and the pursuit of the shortest delivery distance.

Value
Given the future operating trends of the new retail, the model presented in this research can provide independent business, logistics operators or business area managers with the ability to apply the instant motorcycle pick-up service to the retail industry in the business area.

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IMPLEMENTATION CHALLENGES OF BLOCKCHAIN IN SUPPLY CHAINS IN THE CONTEXT OF INDIAN

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Purpose
Blockchain is considered as a disruptive technology that has the potential to revolutionise the future businesses. It offers end-to-end transparency benefits by protecting digital record from deletion, tampering, and revision along the supply chain. It is expected that the world-wide spending on blockchain solutions to reach US$11.7billion by 2022 from US$0.95billion in 2017 (Statista, 2018). Although it appears the application of this technology is gaining momentum, organisations, however, are facing challenges in implementing the blockchain technology. Developing prior knowledge on challenges will facilitate the successful implementation of blockchain. The aim of the research is to identify and prioritise the implementation challenges of blockchain in supply chains.

Design/methodology/approach
Through literature review this study develops a conceptual framework by extending TOE (technology, organisational-context, and external environment) framework with the addition of inter-organisational relationships as a challenge-category of implementing blockchain technology in supply chains. A total of sixteen challenges are identified from the literature which is grouped under four challenge-categories. To prioritise critical implementation challenges, analytical hierarchy process (AHP) method is employed in this study. A two-part questionnaire with organisation and respondent demographic questions in one part and AHP comparison scale on challenges and challenge-categories in the second part is used to conduct interview with technology provider, consulting firm, and industry partner. Expert choice® software is used to calculate the priority weights of challenges and challenge-categories of blockchain technology implementation in supply chains.

Findings
Results indicate that organisational-context challenge-category is identified as the most critical challenge-category, followed by technology challenge-category in implementing blockchain technology in supply chains. On the other hand, external environment and inter-organisational relationships challenge-category are less critical in blockchain technology implementation. At challenge level complexity, financial resources, and top management support are considered as the top critical challenges.

Value
This research is an initial attempt to identify and develop a framework on the challenges in the implementation of blockchain technology in supply chains. By empirically examining the developed challenge framework in the Indian context,

this research provides an explanation on how the framework can be used in future studies.

Research limitations/implications
This study investigates the blockchain implementation challenges in Indian context, so the results may not be generalised to other nations.

Practical Contribution
Insights into challenges and their criticality help organisations to develop strategies to assist in addressing the challenges and facilitates in their decision-making of the implementation of blockchain technology in supply chains

ENERGY-SAVING MEASURES BY LOGISTICS CLIENTS

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Purpose

As the need to address environmental problems intensifies, it has become clear that reducing energy consumption in logistics activities, and the associated environmental impact, is a very important issue. In Japan, as well, companies are making progress in the development of energy-saving logistics practices. One characteristic of the legislation which has been passed in Japan to promote energy efficiency is that it places the responsibility for reducing energy consumption not only on companies that handle distribution, but also on those that produce large volumes of goods which need to be transported to final users. In the roughly ten years since this legislation was passed, various measures have been adopted by product manufacturers and distributors (hereafter "logistics clients"). This paper intends to examine the measures that logistics clients have actually taken, and the degree to which their efforts have actually reduced energy consumption, as well as the current issues and hurdles they are facing in their energy-saving efforts. Furthermore, in light of additional changes to Japan's regulations introduced in 2018, we will examine new measures that are being discussed or implemented.

Design/methodology/approach

Under Japanese regulations, companies that are large-scale logistics clients (roughly 800 corporations nationwide) are required to develop plans to reduce energy consumption, and to file reports with the government on a regular basis to describe the progress they have made in implementing these plans. By analyzing these periodic reports, we will quantify the amount of energy savings that the companies were able to achieve in their distribution activities, and clarify the issues and obstacles they encountered. In addition, we conducted interviews with those companies that had achieved particular progress in logistics-related energy savings, to learn about new logistics measures they have discovered or intend to pursue in order to further reduce energy consumption in their distribution activities.

Findings

By analyzing the improvements companies made and the actual change in energy consumption (in units) we determined that since legislation was introduced, in 2010, companies have achieved an average annual 3% reduction in energy consumption, but that in recent years the pace has slowed substantially, to around 1% year on year. After analyzing the measures that companies took, and the progress they have made, we determined that the greatest progress was achieved by selecting more appropriate types of delivery vehicles, rationalizing distribution routes or the distribution process, conducting joint deliveries or mixed product deliveries to improve efficiency, and using more

efficient commercial vehicles, particularly large-scale trucks, to conduct the deliveries. In recent years, the degree to which such measures can cut energy consumption has become limited. In order to make further progress, logistics clients will have to cooperate with the intended recipients, or adopt novel approaches to the problem.

Value

By investigating and quantifying the measures that logistics clients have used to reduce energy consumption, this paper can help emphasize the importance of addressing energy consumption in the logistics business, not only for companies in the distribution sector, but for logistics clients as well. In addition, the paper helps to clarify the fact that there are limits on how much progress can be made by companies at the "dispatching" end of the supply chain, working alone. This illustrates the need for greater cooperation between the logistics clients, and companies at the "receiving" end of the supply chain. Issues such as the volume and frequency of orders, lead time, specified delivery times, standardization of delivery methods and a multitude of other distribution conditions need to be re-examined and rationalized. The paper will also present specific examples of companies that have taken such steps, and the results they have achieved.

Practical Contribution

Cooperation between logistics clients, shipment recipients and the companies carrying out the distribution activities is absolutely essential to achieve further progress. The legislative changes introduced in 2018 requires companies that are the large-scale recipients of deliveries to take measures, as well. It is expected that this will promote a further re-examination of distribution conditions, and greater progress in cutting energy consumption. The paper offers examples that will help quantify the current level of progress

COMPREHENSIVE PLANNING OF A SUSTAINABLE HYDROGEN ECONOMY CONSIDERING BUSINESS, SOCIAL, ENVIRONMENTAL IMPACTS: RENEWABLE HYDROGEN SUPPLY CHAIN IN JEJU ISLAND, KOREA

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Purpose
For the successful introduction of the hydrogen economy, A customer satisfaction through providing convenient infrastructure is very critical, as well as hydrogen production in a good manner. Customer satisfaction in the transportation sector particularly correlates with the driving distance for refueling customer's fuel cell vehicles.

Design/methodology/approach
We aim to develop a new optimization-based approach for the strategic planning of a renewable hydrogen supply system using wind energy with the uncertainty of wind speed and wind direction. To achieve this goal, we develop an optimization model to design and analyze a wind-based hydrogen supply (WBHS) system using a mixed-integer linear programming technique

Findings
In this model, we include decision variables to account for a wide range of issues regarding the proposed system (from the technical selection of the wind turbine and wind farm layout design to strategies for a wind farm) and hydrogen supply network development

Value
Using the proposed approach, we are able to i) identify the configuration and operational practices of an optimal WPHS system, and ii) provide decision-

making guidance to stakeholders and policymakers for planning an economically sustainable hydrogen supply system

Practical Contribution
To illustrate the capability of the proposed approach, we present a case study pertaining to the design of the WBHS system for the road transportation sector of Jeju Island, Korea.

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DRIVERS AND BARRIERS TO SUSTAINABLE SUPPLY CHAIN MANAGEMENT IMPLEMENTATION IN EGYPTIAN INDUSTRIES

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Purpose
Since sustainability and supply chain management are currently gaining more importance in the research fields. This study aimed to identify drivers and barriers to sustainable supply chain management (SSCM) implementation in Egyptian industries, and to provide recommendation for organizations operating in Egypt on how to overcome these barriers.

Design/methodology/approach
This study is considered an empirical study with a descriptive research approach using qualitative methodology. The primary instrument used for data collection was semi-structured interviews with an interview protocol developed on the basis of previous literature to enhance reliability of such instrument. Qualitative analysis was conducted through deductive coding and categorization. The population for this research was all industrial companies operating in Egypt, where non-probability–purposive judgment–sampling technique was used. So, a final sample included 14 organizations representing four different industries with 22 experts engaged in sustainability implementation within supply chain functions were interviewed.

Findings
This study had revealed multiple drivers and barriers to SSCM implementation in Egyptian industries and how those specific drivers and barriers might differ from the barriers and drivers mentioned in previous literature. Additionally this study helped in understanding the influence of drivers and barriers on sustainability implementation within supply chain functions. Additionally this study had recommended multiple explanations to overcome these barriers generated through organizations which successfully managed to deal with these barriers previously.

Value
Since there is a lack of prior studies on similar topic in Egypt, this study provided in-depth understanding for barriers and drivers for SSCM implementation in Egyptian industries as well as valuable recommendations to overcome these barriers.

Research limitations/implications
Limitations for this research were due to lack of availability of reliable sources of data which limit the sample size in multiple industries. Additionally, this study focused on large organizations hence results might vary for small and medium enterprises. Thus future research focusing on SSCM implementation among

small and medium size enterprises in Egypt and analyzing data specific to each industry is recommended.

Practical Contribution

This study provides insights for managers of industrial organizations operating in Egypt about drivers and barriers to SSCM implementation in Egypt, as well as valuable suggestions and recommendations on how to deal with these barriers

AN INTERPRETIVE STRUCTURAL MODELING (ISM) APPROACH FOR ANALYZING BARRIERS TO SUSTAINABLE SUPPLY CHAIN MANAGEMENT IMPLEMENTATION IN EGYPTIAN INDUSTRIES

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Purpose
Since sustainability and supply chain management are currently gaining more importance in the research fields. This study aimed to explore relationships among barriers to sustainable supply chain management (SSCM) implementation in Egyptian industries, and their influence on each other in order to provide a structured model for interrelationships between barriers and offer solutions or recommendations to deal with these barriers.

Design/methodology/approach
This study is an empirical study with a descriptive research approach using qualitative methodology to collect data about barriers to SSCM implementation in Egyptian industries and ways to overcome these barriers through interviewing experts engaged in sustainability implementation within supply chain functions from different organizations representing four different industries followed by interpretive structural modeling (ISM) for barriers to SSCM to develop an overall structured model representing possible interrelationships between barriers.

Findings
ISM analysis helped in shaping barriers into a structured model with clear identification of relationships among these barriers. ISM analysis for barriers to SSCM implementation in Egypt helped in prioritizing barriers that would help in providing solutions for most important barriers that would help in overcoming barriers to SSCM implementation in Egypt.

Value
This study is considered among the very first studies to implement ISM for barriers to SSCM on data collected from Egypt which is considered a constructive addition which would help in developing strategies to overcome these barriers.

Research limitations/implications
Future researches might consider developing ISM analysis for smaller number of barriers to minimize its complexity hence maybe reaching different results. Moreover since ISM analysis technique is known to be highly dependent on the experience and knowledge of experts' opinions, validation of ISM through the use of structural equation modeling or linear structural relationship approach to test the validity of such hypothetical model is recommended.

Practical Contribution
This study provides insights for managers about barriers to SSCM implementation in Egypt, and recommendations on how to deal with these barriers

ENVIRONMENTAL SUSTAINABILITY OF LOGISTICS SERVICE PROVIDERS: A SYSTEMATIC LITERATURE REVIEW ON INDICATORS FOR CITY LOGISTICS

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PurposeUnited Nations reported that currently in Europe, 70% of the population lives in urban and metropolitan areas, this number is expected to reach 85% by 2050 (Russo and Comi, 2016). The increasing logistics and transport activities in the city significantly impact on the environment we live in. Provision of green and sustainable logistics services is on the top of logistics service providers' (LSPs) agendas and can also become a competitive edge to their customers (Piecyk and Björklund, 2015). Both academics and industry have shown increasing attention to measure the logistics sustainability in the recent decade, yet limited research has been developed comprehensively (Evangelista et al., 2018). Thus, LSPs' sustainability performance measurement methods and relevant indicators need to be assessed and updated particularly in the context of city logistics. To fill this gap, this paper aims to identify and evaluate the current frameworks and indicators that reflect the performance of LSPs' environmental sustainability in academic publications, and further propose a practical set of sustainability indicators to assess the city logistics 'greenness' and environmental sustainability in LSPs' operations.

Design/methodology/approach To achieve this aim, a systematic literature review was carried out to map out the existing measurement indicators of environmental sustainability that apply in city logistics and LSPs domains. The academic database - Scopus was primarily used, and key references were added as supplement through cross reference. A total of 56 papers dating from 2010 - 2018 were selected and analysed in detail to investigate how the different environmental sustainability measurement frameworks/methods are used by different industries for their logistics operations, and what indicators are applied.

FindingsDespite the increasing numbers of published papers on environmental sustainability measurement since 2010, few studies have focused on city logistics and freight transport sector. Among various frameworks identified, the Triple Bottom Line (TBL) and the Global Reporting Initiative (GRI) are the two major frameworks adopted by scholars when assessing sustainability. However, the research in city logistics has yet to embrace the GRI framework in the environmental sustainability evaluation.

ValueThis study attempts to fill the research gap of current studies by providing a comprehensive review of the indicators to assess the environmental sustainability of LSPs in the city logistics context. A framework embedded with

GRI framework was developed to provide a set of updated indicators. Future research directions are also highlighted.

Research limitations/implications The literature reviewed only included academic articles at this stage, industry and government reports shall be considered in future research to comprise an exhaustive review.

Practical Contribution This paper provides a basis for future research to develop a comprehensive taxonomy of sustainability for city logistics to select the suitable environmental sustainability indicators and measure LSPs' sustainability performance, which will enable LSPs to benchmark the status-quo of their 'greenness', and identify the hurdles to fulfil environmental sustainability requirements and adopting realistic and practical practices for improvement

THE EFFECT OF SUPPLY CHAIN COOPERATION ON THE STRATEGY OF SMES IN HUNGARY

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Purpose
This study aims to examine how Supply Chain Management (SCM) affect the creation and modification of the strategy of Hungarian Small and Medium Enterprises (SMEs).

Design/methodology/approach
After a detailed literature review, we set up our hypothesis: SMEs don't pay enough attention to their strategies. This is increasingly true of dealing with important factors such as 1.) Supply Chain cooperation or 2.) Digitalisation. For data collection,we conducted a question-based survey. The questions were directed towards the conformity of the companies' "Strategy", their (external) "Supply Chain" and their readiness on "Digitalisation". In total, 273 valid responses were collected from Hungarian SMEs, with focus on the highly industrialised North-Western region of the country. The survey was answered by executives of companies of the production-, commerce- and service sectors. The methodology applied for analysis of the data acquired was empirical analysis (SPSS). In the current paper we highlight how far the cooperation with other SC members will influence the creation/modification of the strategy of these companies.

Findings
Results of the study showed that nearly 50% of Hungarian SMEs have not changed their company strategy in the past three years. (Rearranging their organizational structure has been their lowest priority). However, SMEs that modify their company strategy more frequently (every year or every other year), usually use the pull system rather than the push system. It is true for both, the Supplier's and the Customer's side. They also use up-to-date management tools e.g. VMI or postponement more frequently.

Value
This research shows a backlog of supply chain practices' implementation in Hungarian SMEs. Strategic decision makers should be aware of the challenges SMEs are facing when cooperating vertically or horizontally with other SC

member companies. International research benchmarks show that an appropriate strategy change has high impact on the company's performance.

Research limitations/implications
We are aware of the limitations of our research. For example, we didn't distinguish between SMEs acting in the FMCG sector vs. industrial goods sector. The unique structure of the SME sector in Hungary makes benchmarking results also uncertain. As a next step we would also need to fine-tune the given chain's dominance influencing factor.

Practical Contribution
Findings of this study can be used by strategic-level management in SMEs to better understand what tools their company could use in SCM operation, and whether they need to reiterate their strategy to fit the market's needs in the age of globalisation and time based economy.

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