

Supply Chain Perspectives

VOL 11 ISSUE 2 2010

**CHANGE ANALYSING GLOBAL ENERGY TRENDS IN ROAD FREIGHT
TRANSPORT**

**INTEGRATED THE ROLE OF SUSTAINABILITY IN SCM
THE CASE OF THE SUSTAINABLE PACKAGING SUPPLY CHAIN**

SME VULNERABILITY IN THE SUPPLY CHAIN

SUPPLY CHAIN SUSTAINABILITY



National Institute for
Transport and Logistics



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NITL welcomes you to the latest issue of *Supply Chain Perspectives* (SCP).

This issue is primarily concerned with the need for a strong focus on sustainability, including environmental sustainability, within firms and across supply chains. There is a growing awareness of the need for such a focus not least because of issues associated with climate change and environmental degradation.

The first feature article by Maja Piecyk and Alan McKinnon examines the amount of energy consumed in the movement of freight by road. Maja and Alan are based at the world renowned Logistics Research Centre (LRC) at Heriot-Watt University in Edinburgh and have been actively involved in the UK Government supported Green Logistics project. The next two articles are based on work carried out recently by visiting scholars at NITL. The first, by Chris Kelleher who is based at Ohio State University, focuses on the potential of environmental management systems (EMS) in the third party logistics (3PL) sector. The second, by Juan Carlos Carrasco Giménez, is concerned with the role of rail freight in an Irish context. In the next article, Edward Sweeney suggests how SCM can be used in the elimination of waste across supply chains, with specific reference to the development of more sustainable packaging. Patrick Daly's article explores the issue of SME vulnerability in supply chains. It highlights the importance of relationship building and management by SME in the current highly competitive environment.

Our usual website reviews are included in this issue, as is the popular *Supply Chain Forum* to keep you abreast of the latest developments in NITL and the wider Irish and international supply chain community. Of particular interest in this issue is *Logistics Ireland 2010* – Ireland's premier SCM and logistics event takes place on October 19th and we look forward to welcoming you back to the Crowne Plaza in Northwood. We value your feedback on *Supply Chain Perspectives* and on our other activities – please contact us with any suggestions or if we can help you in any way.

Your NITL Team

SUPPLY CHAIN MANAGEMENT FORUM

A Review of Developments at NITL and the World of SCM

Logistics Ireland 2010

19th October, Crowne Plaza, Northwood Demesne, Dublin 9

Logistics Ireland 2010, hosted by NITL, in partnership with the Chartered Institute of Logistics and Transport (CILT) Ireland, takes place on the 19th October 2010 in the Crowne Plaza Hotel in Santry, Dublin 9. This year's event promises to be the best yet with speakers from a range of backgrounds with a wealth of leading edge knowledge. Keynote speakers include Dr. John Gattorna (Victoria University, Melbourne), Dominic Carolan (VP Manufacturing Operations at Genzyme Corporation), Gerrit-Jan Steenbergen (VP 3i Innovation Centre, Zetes), Joe Reynolds (Chairman of Reynolds Logistics) and Prof. John Mangan (Newcastle University).

The conference theme this year is *Dynamic Supply Chain Management and Logistics leading the Recovery*. All companies are now operating in an environment characterised by intense competition in markets that comprise increasingly discerning customers. In addition to the pace of change in markets and the wider business environment, technological change continues apace. This evolving corporate landscape requires organisations to be agile not only throughout their supply chain operations but also at the level of strategic decision making. There is evidence to suggest that a more dynamic approach to strategy formulation is a prerequisite for the development of responsive end-to-end supply chains. For many firms, effective supply chain management (SCM) offers a coherent way forward in addressing the myriad challenges in an integrated and aligned manner. SCM recognises that integration of supply chain activities and processes is a critical success factor in eliminating waste and increasing value-adding capability, thus enhancing overall competitive advantage. These issues are particularly important for an island economy and apply to all companies no matter their size or industry sector. The conference will

LOGISTICS IRELAND

Ireland's Premier Supply Chain Management Conference

focus on understanding how a dynamic approach to SCM and logistics provides the key to building the necessary competitive capability so that organisations can tap into the upturn when it inevitably happens.

Our first keynote address is by Dr John Gattorna who has been working in the distribution/logistics/supply chain space for over 25 years and is associated with many 'signature concepts' in SCM and is an undisputed 'thought leader' in the field. John is much sought after as a Keynote speaker on the international conference circuit, and continues to write at a prolific rate. His presentation will set the scene for the conference and will highlight the critical need for a new business model for contemporary supply chains. This radically new approach recognises that people ultimately drive, and are served by, supply chains but that this central issue has been largely ignored in the past.

He will be followed by Dominic Carolan, Senior Vice President, Manufacturing Operations, Genzyme Corporation. Dominic is a 30 year veteran of the pharmaceutical industry. He joined Genzyme in 2001 to build the Irish organisation and to establish the company's manufacturing base in Waterford. He currently has responsibility for a number of manufacturing sites and supply chain operations. His presentation will introduce delegates

to the critical success factors in building and sustaining a robust supply chain in the highly competitive and dynamic world of biotechnology.

The third keynote speaker is Gerrit-Jan Steenbergen, Vice President 3i Innovation Centre at Zetes, the leading pan-European company in the value-added solutions and services industry for automatic identification of goods and people. The rapid rate of development of technology, in particular information and communications technology (ICT), in recent years has brought with it both opportunities and threats from a supply chain improvement perspective. Gerrit-Jan's presentation focuses on the role of technology as a key enabler of aligned supply chain processes. He will illustrate his theme with many practical examples from his extensive experience.

Joe Reynolds, Chairman of Reynolds Tankers Group, provides the next keynote address. Reynolds Logistics is an award winning Irish company that provides a specialised transport and distribution service for the oil industry. The main purpose of Joe's contribution is to share with delegates the key elements in Reynolds Logistics' successful approach to developing its business in a highly competitive world of transport and logistics. A key element of this involves the building and sustaining of relationships with key supply chain partners. Understanding the practical collaborative issues that need to be addressed in this context is an important focus.

NITL is delighted to welcome Professor John Mangan back to Ireland as the final keynote speaker at *Logistics Ireland 2010*. John holds the Chair of Marine Transport and Logistics at the University of Newcastle (UK). In addition to his specific expertise in marine issues, he is also one of the leading SCM academics on these islands and is a regular speaker on a wide range of issues at international seminars and conferences. John's speech will focus on the changing nature of global logistics and Ireland's place in this evolving system. SCM and logistics professionals have long been at the vanguard of economic and business globalisation. John's contribution will highlight both the opportunities and

threats afforded by the changing landscape from the perspective of Irish policy makers and managers.

In addition to the keynote presentations, *Logistics Ireland 2010* also provides delegates with the opportunity to engage in a question and answer session with an Expert Panel. This session will again be chaired by Ingrid Miley of RTE and will be a lively debate on the main issues raised during the keynote presentations.

We are also delighted to announce that John Gattorna's new book - *Dynamic Supply Chains: Delivering Value through People* – is included in the delegate pack. Many thanks to ModusLink for sponsoring this. The official Irish launch of the book will take place at the end of the conference where delegates can collect their complimentary copy. We would also like to thank our other confirmed conference sponsors, GeoDirectory, Motorola and Freightfox, see the conference website for more information http://www.nitl.ie/Conference_Sponsors/Default.350.html

Demand for delegate places at the conference is high this year, so to secure a place at the conference or if you want more information about the event contact the Event Manager, Pamela O'Brien at NITL (pamela.obrien@dit.ie) or visit www.nitl.ie



Ph.D. Graduate Wins Prestigious Memorial Cup

Dr. Pietro Evangelista has won the James Cooper Memorial Cup for the best PhD on a supply chain management topic in the UK and Ireland. His Doctoral research was carried out at NITL and the Logistics Research Centre (LRC) at Heriot-Watt University in Edinburgh under the supervision of Edward Sweeney and Prof. Alan McKinnon.

The prize, awarded by the Chartered Institute of Logistics and Transport (CILT) in the UK, is named in memory of Professor James Cooper. Inaugurated in 2000, it is awarded annually to students at UK or Republic of Ireland universities for research that makes an original contribution to the field and is directly relevant to the management of the end-to-end supply chain.

Pietro was awarded the prize for his thesis entitled: "Dissemination of information and communication technology in supply chain management: the impact on small and medium sized transport and logistics service providers".



Prof. Alan McKinnon (Heriot-Watt University), Sir Moir Lockhead (President, CILT UK), Dr. Pietro Evangelista, Edward Sweeney (NITL), Prof. Mike Browne (Chairman, LRN)

He was presented with Memorial Cup at the recent annual Logistics Research Network (LRN) conference hosted by the Institute for Transport Studies (ITS) at the University of Leeds.

Martin Christopher Gives Seminar at DIT

Professor Martin Christopher was in Dublin recently to present a seminar at the DIT. His presentation, entitled "Mega-Trends that are Re-Shaping the Supply Chain Landscape" captured many of the organisational and environmental challenges in evidence in today's global business landscape.

Martin is Emeritus Professor of Marketing and Logistics at Cranfield School of Management. His work in the field of logistics and supply chain management has gained international recognition. He has published widely and his recent books include *Logistics and Supply Chain Management* and *Marketing Logistics*. Martin Christopher co-founded the *International Journal of Logistics Management* and was its joint editor for 18 years. He is a regular contributor to conferences and workshops around



the world.

Martin has been a regular visitor to Ireland in recent years and was a keynote speaker at *Logistics Ireland 2009* last October. For further information about his work visit <http://www.martin-christopher.info>.

CILT Fellowship for NITL's Director of Learning

Edward Sweeney of NITL has been elected to a Fellowship of the Chartered Institute of Logistics and Transport (CILT).

The Chartered Institute of Transport (CIT) was established in 1919 and received a Royal Charter in



Paul Mallee, President of CILT presents the Fellowship certificate to Edward Sweeney

1926. CIT and the Institute of Logistics & Transport merged in 2002 to form the CILT. The principal objective of the Institute is "To promote the art and science of logistics and transport in Ireland". It achieves this objective through both its membership and its educational qualifications, which are both invaluable to an individual's career. The Institute is a membership-based organisation with over 30,000 members in over 30 countries.

Election to Fellowship is granted by the Institute's Council in the case of an individual's undoubted eminence in the logistics, transport and supply chain management industry. Edward was presented with his Fellow's certificate at the recent CILT International Speech and Conferring ceremony in the Shelbourne Hotel in Dublin. This year's speech was delivered by Liam Cassidy and was entitled "Implementing Change Programs - why they succeed and why they fail".

NITL Hosts Visit by Finnish Academic

NITL recently hosted a visit by Dr Anasse Bouhlal of Tampere University of Applied Sciences (TAMK) in Finland. TAMK is an internationally-oriented multi-disciplinary university offering higher education in seven fields of study and over 40 degree programmes. It is located in the city of Tampere, Finland's second most populous and the towns of Ikaalinen, Mänttä-Vilppula and Virrat. Dr Bouhlal is Principal in the Supply Chain Management and ERP Systems Department at TAMK. Research interests within the Department overlap significantly with those of NITL in areas such as city logistics, green supply chains, healthcare logistics and ERP applications for SMEs.

The meeting explored possible collaboration between TAMK and NITL in post graduate education and research. Antonio de Linares of NITL commented that: "NITL already has well established links in the Nordic region and looks for-



Edward Sweeney, Anasse Bouhlal and Antonio de Linares photographed at DIT Bolton Street

ward to building on this through its work with TAMK. There is a strong shared vision particularly in relation to building partnerships with industry".

USEFUL WEBSITES

The website reviews in this issue of *Supply Chain Perspectives* have a strong environmental theme. *Green Logistics* is a major UK-based research project that focuses on the creation of more environmentally sustainable supply chains. Our partners at Heriot-Watt University (see feature article) are part of a consortium of several universities working on this initiative. The *Sustainable Energy Authority of Ireland* (SEAI), formerly the Irish Energy Centre was set up by the government in 2002 as Ireland's national energy authority. *Supply Chain Management Review* is a useful source for a range of logistics and SCM information, including material of specific interest from a sustainability perspective.

Green Logistics—www.greenlogistics.org

Green Logistics is a programme committed to researching methods and efforts to create sustainable supply chains through various different themes. It is supported and funded through many different partners, the lead being the Engineering and Physical Sciences Research Council (EPSRC) located in the UK. Other partners include CILT, DfT, and the FTA. Green Logistics' main objectives include gathering research from all fields of sustainable logistics into one place, and provide research findings for how pollution will increase if nothing is changed, and what methods can help businesses increase their environmental performance. The website provides all research currently in development as well as modules that have been completed, and is a great resource for academics and companies alike.

GREEN LOGISTICS
Research into the sustainability of logistics systems and supply chains

Home News About the Project Themes and Outputs Other Publications Archive Contact Us

Home
What is Green Logistics?
Logistics is the integrated management of all the activities required to move products through the supply chain. For a typical product this supply chain extends from a raw material source through the production and distribution system to the point of consumption and the associated reverse logistics. The logistical activities comprise freight transport, storage, inventory management, materials handling and all the related information processing.

If you wish to inform the Green Logistics Project of your related research, please [Contact Us](#).

News Items
11-15 July: Green Logistics at the WCIR 2010 Conference in Lisbon, Portugal
Green Logistics will be presented in a dedicated track at the 12th World Conference on Transport Research 2010 in Lisbon.
Characteristics of retail waste logistics - A case study on Winchester High Street
New Report: Characteristics of retail waste logistics - A case study on Winchester High Street
Waste Management and Take-Back Processes in a Dedicated Shopping Centre
New Report: Waste Management and Take-Back Processes in a Dedicated Shopping Centre. Results from the Southampton WestQuay shopping centre Managers Survey

SOCIETY
safety
health
access
equity

ECONOMY
growth
efficiency
employment
competitiveness
choice

ENVIRONMENT
climate change
air quality
noise
land use
biodiversity
waste

SUSTAINABLE LOGISTICS

The main objective of logistics is to co-ordinate these activities in a way that meets customer requirements at minimum cost. In the past this cost has been defined in purely monetary terms. As concern for the environment rises, companies must take more account of the external costs of logistics associated mainly with climate change, air pollution, noise, vibration and accidents. This research project is examining ways of reducing these externalities and achieving a more sustainable balance between economic, environmental and social objectives.

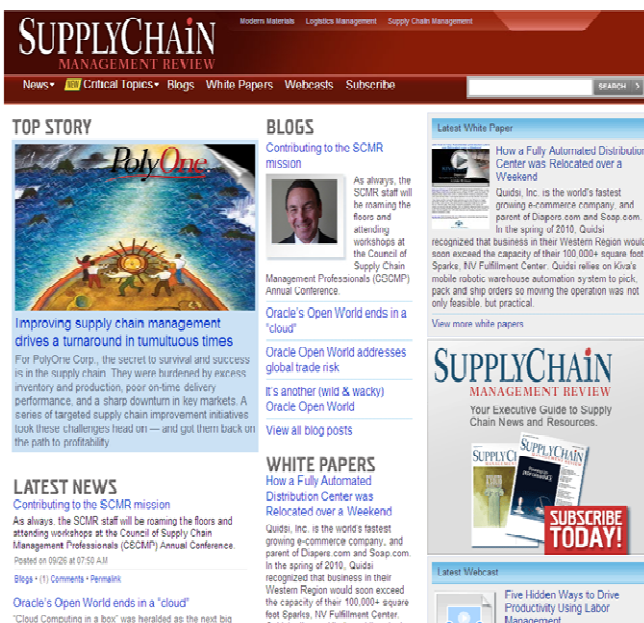
CARDIFF UNIVERSITY PRIFYSGOL CAERDYDD
HERIOT-WATT UNIVERSITY
LANCASTER UNIVERSITY
University of Southampton
UNIVERSITY OF LEEDS
University of Westminster

Sustainable Energy Authority of Ireland— <http://www.seai.ie>

The Sustainable Energy Authority of Ireland the national energy authority in Ireland. Their mission is to help Ireland become a nation dependent on sustainable energy resources throughout. The main objectives include implementing actions that reduce energy usage, researching new techniques, and supporting innovative ideas for the future. The website is full of information related to sustainability, including a statistics bank comparing current energy levels and their respective emissions, based on many factors, including separation by industry and type of energy. Information is also available for business about how to improve their business practices, building structures, and education on various types of renewable energy options. From a logistics perspective, the website is full of information that is directly related to the transportation industry, including current levels of CO₂ emissions and pollution based on various kinds of energy. The website is easy to navigate, and full of information to anyone considering their own environmental output.



Supply Chain Management Review—<http://www.scmr.com/>



Supply Chain Management Review is a great source for anyone interested in current news in various aspects of supply chains. With a free e-newsletter and articles available online, a wealth of information is available on multiple topics. These include procurement and sourcing, software and technology, supply chain education, supply chain finance, supply chain management, third-party logistics, and many others. White papers and blogs are also available, including webcasts, but for a subscription cost. Although based in the United States, the information available can be relevant to any industry in some way. As a part of the Supply Chain Group, the website also has links to other news sources, including *Logistics Management*, *Modern Materials Handling*, and *Material Handling Product News*.

Analysing Global Energy Trends in Road Freight Transport

By Maja I. Piecyk and Alan C. McKinnon

Introduction

This paper examines the amount of energy consumed in the movement of freight by road. It is estimated that in 2000 trucks used a total of 19.25 exajoules (EJ) of energy worldwide, a quarter of the total energy consumed by the transport sector in that year (WBCSD, 2004). The majority of freight movements by road is contained within national borders. Available data for 25 EU member states (excluding Greece and Malta) indicates that an average of 30% of road tonne-kms crossed international frontiers in 2005 (Eurostat, 2007). Road's share of transcontinental freight movement is much lower. Of the three main transcontinental trade routes (Asia-North America, North America-Europe and Asia-Europe) only that between South East Asia and Europe offers the potential for surface transport links. Very little freight traffic currently moves on this route by road. It was estimated that in 2005 less than 5% of full load containers moving between China and Europe moved by surface modes (Farahmand-Razavi, 2008). As limited data is available on the cross-border movement of freight by road, most of the statistics presented and discussed in this paper relate to domestic

freight movement within individual countries.

Modelling the link between demand for road freight transport and its energy requirements

The relationship between GDP and the energy consumed by freight transport can be decomposed into a series of aggregate values and ratios (Figure 1). This approach has been adopted in previous research projects in Europe to determine the links between economic growth and freight traffic levels (e.g. REDEFINE, SULOGTRA, Trilog-Europe). Unfortunately, only a few countries have sufficient data to calibrate this model and even in these countries the estimation of key ratios, such as the

average value density and handling factor, is crude.

A simplified version of this model can be applied across parts of the developed world linking GDP, tonne-kms (road and rail), vehicle-kms (road) and fuel consumption (road). This permits an analysis of the key drivers of changes in energy use: economic growth, freight transport intensity (ratio of tonne-kms to GDP), average payload weight (ratio of tonne-kms to vehicle-kms) and fuel efficiency (ratio of fuel consumption to vehicle-kms). The framework will be used to structure the content of this paper but, given data limitations, it will not be possible to quantify it. There is a serious lack of statistics on surface freight transport systems around the world.

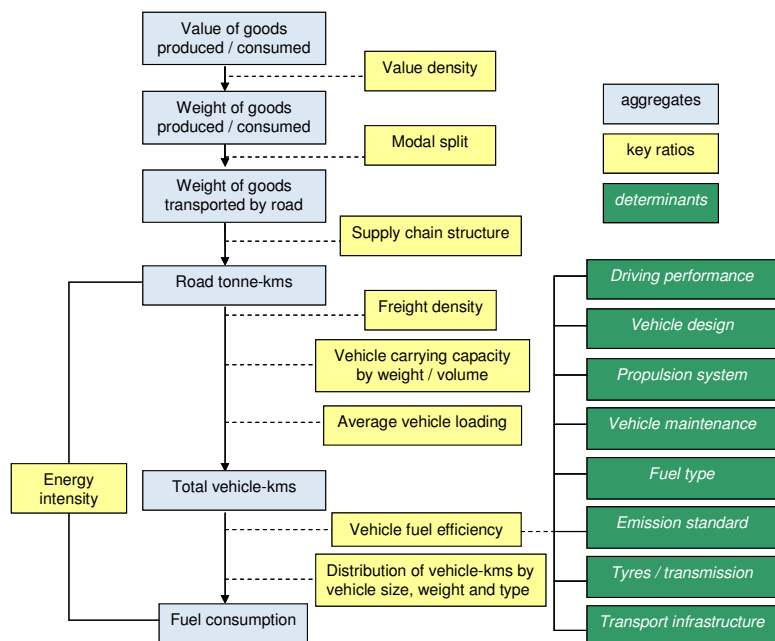


Figure 1: Analytical framework

Table 1 summarises the availability of data on the key freight parameters which would be needed to operationalise the model outlined above. Most of the available data is concentrated in OECD countries, though even here there is a dearth of statistics on vehicle loading and fuel efficiency. Even where statistics are available for particular countries they are often collected and / or classified in ways that make them incompatible with the main international data sets.

Relationship between GDP and the demand for surface freight transport

There has traditionally been a very close relationship between GDP and tonne-kms growth. A cross-sectional study of a sample of thirty-three countries at different stages of development undertaken by the World Bank using 1989 data found that differences in GDP (with national currencies 'converted at purchasing power parities') explained 89% of the variation in road tonne-kms (Bennathan et

al, 1992). Much of the freight forecasting undertaken at national and continental levels has assumed that this relationship will remain very close, i.e. that freight transport intensity (tonne-kms per unit of GDP) will be constant. New analysis of freight transport intensity trends in a broad range of countries, however, reveals wide differences in their recent trajectories (Figure 2).

The ratio of road and rail tonne-kms to GDP varied within the range +20% / -20% in most of the countries examined, though in Portugal and Hungary this freight transport intensity index rose by almost 60% between

2003 and 2007. Even within the EU some countries have been experiencing a steep increase in surface freight transport intensity while others have exhibited a decline. In some countries, such as the US and the UK, where GDP and tonne-km trends had been decoupling (McKinnon, 2007), recent data suggests that some 'recoupling' is underway (McKinnon et al., 2008).

There is some evidence to suggest, however, that beyond a certain level of development the freight transport intensity of an economy starts to decline, primarily for four reasons:

1. The share of GDP associated with production industries declines and much of the new economic growth comes from service activities which generate less freight tonne-kms per \$1bn of output.

2. As consumers' income increases, the value density (i.e. ratio of value to weight) of the products they purchase tends to

Table 1: Availability of Data on Key Surface Freight Parameters

Data Country	Road Vehicle kms	Road Tonne-kms	Average payload weight on road	% empty running by trucks	Modal split	Energy consumption / fuel efficiency
Europe			Tonne-km / laden km ratio for many countries		By tonne-kms and tonnes-lifted	Data available for some countries: UK, France, Germany, Spain, no time-series data. Mainly for road / limited for rail
North America	US Canada	US Canada: only for for-hire carriers not own account	Possible to estimate US: tonne-km / vehicle km Canada: only for for-hire carriers		US: by tonne-kms and tonnes-lifted	US: road and rail Canada: only for rail
South America	Country	data	may be	available	in local	language
Asia						
Africa		RSA, Zambia			RSA, Zambia World Bank-railfreight data available	
Australia & New Zealand			Possible to estimate			

Data not available / not yet found
Limited availability
Moderate availability
Data available

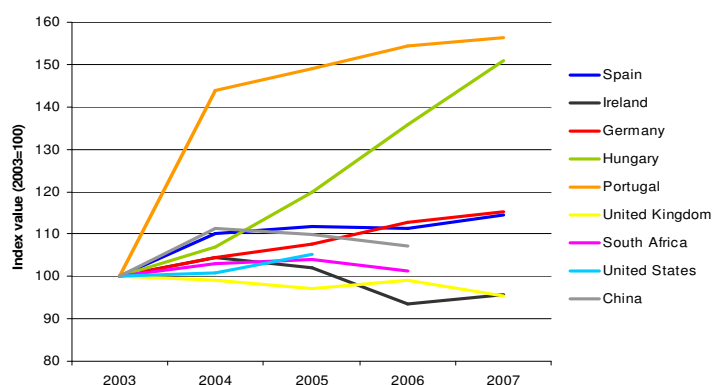


Figure 2. Trends in Ratio of Road and Rail Tonne-kms to GDP

decline as they trade up to more expensive items.

Data on material consumption for some developed countries suggests that the total mass of goods in economies increases much more slowly than monetary values of GDP, reflecting trends 1 and 2. This is reflected in the steady increase in the ratio of GDP to Direct Material Consumption (DMC) (i.e. (domestic extraction of materials + imports – exports) in the EU15 between 1995 and 2004. This confirms the likelihood that there will be a longer term decoupling of GDP and tonne-km trends.

an earlier stage in many developing countries. Within the EU over the past 15 years there has been a major shift from nationally-based systems of production and stockholding to pan-European systems focused a few large factories and warehouses. This geographical concentration has been one of the key drivers of surface freight traffic growth. Many companies have, nevertheless, been able to mitigate the effects of centralisation on freight traffic levels, and related energy use, by retaining localised break-bulk operations. This allows them to maintain the efficiency of local delivery opera-

4. Offshoring of manufacturing to lower cost countries.

Higher factor costs in developed countries promotes offshoring of more basic manufacturing operations to lower labour cost countries. In recent decades there has been a massive shift of industrial capacity from developed countries to the low labour cost countries of the Far East and Eastern Europe (Dicken, 2007). When a manufacturing plant is relocated to another country or its output is displaced by imports, the upstream supply chain also moves off-shore, reducing the freight intensity of the 'off-shoring' country and increasing it in the country receiving the manufacturing investment. The positive decoupling of freight demand from GDP in the offshoring country (i.e. tonne-kms rising more slowly than GDP) is then mirrored by an opposite trend in the recipient country. Reductions in freight intensity in one country may simply be counter-balanced by an increase in another. There will, however, to be a net increase in total energy consumption in the freight transport worldwide, partly because of the growth in international trade volumes but also because the energy intensity of freight movement in developing countries is often significantly higher than in developed countries.

Overall, it is likely that continuing economic development over the next years will see more countries entering the phase of declining surface freight trans-

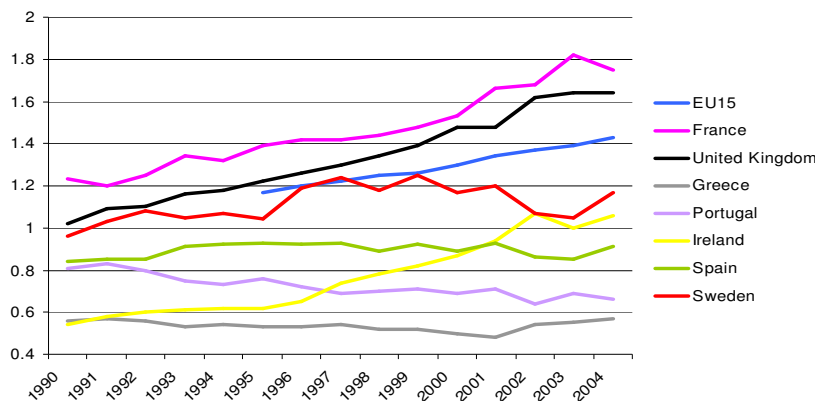


Figure 3: Ratio of GDP to Direct Material Consumption in the EU15 and selected countries (Source: Eurostat)

3. The geographical processes, mainly centralisation and wider sourcing, which are responsible for much of the growth in tonne-kms cannot continue indefinitely and will eventually reach their maximum extent.

Centralisation of production capacity and inventory is now at an advanced stage in most developed countries, though at

tions while enjoying the economic benefits of centralised production and stockholding. The additional energy required to move freight longer distances within these centralised systems can also be partly offset by energy savings resulting from the concentration of production and storage in larger factories and warehouses requiring less energy per unit of output or throughput.

port intensity. This does not mean that the amount of freight movement will decline, merely that it will grow at a slower rate than the economy.

Modal split

Figure 4 shows the recent tonne-km trends for road and rail in a selection of developed countries. In most cases, the amount of freight movement by both modes has been rising, though the rates of increase vary widely between countries. Even within Europe, trends diverge sharply. For example, in the case of road between 1999 and 2007 tonne-kms rose by 93% in Spain and fell by 7% in the Netherlands.

To date only one attempt has been made to forecast the future growth of surface freight movement at a global scale. The Mobility 2030 forecast compiled by the World Business Council for Sustainable Development (in 2003-4) projected an annual average growth of 2.3% in road and rail tonne-kms between 2000 and 2030. Above average growth rates were anticipated in developing countries and below average rates in OECD countries. Freight traffic forecasts also exist for individual countries, such as the US and UK, though often different metrics are used, such as tonnes transported, tonne-kms, vehicle-kms and even value of freight moved. All these freight forecasts are based on assumptions about the future trend in economic growth and the relation-

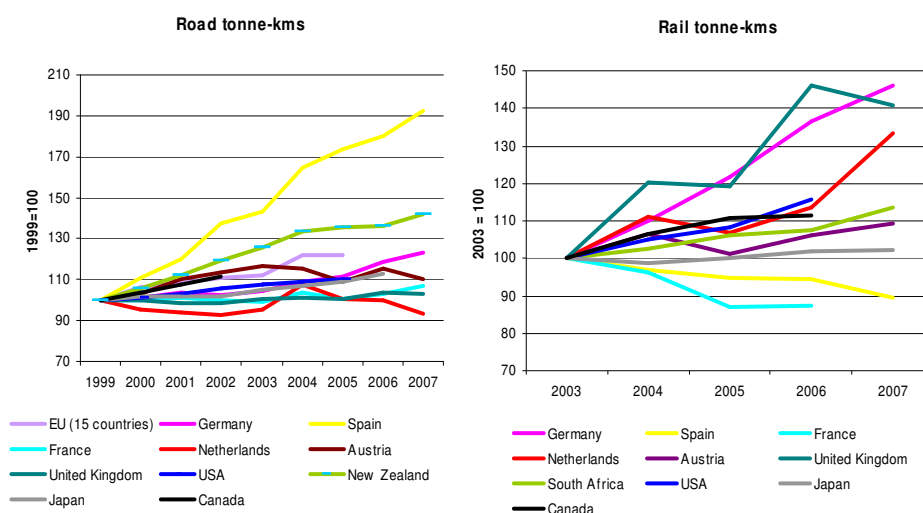


Figure 4: Trends in Road and Rail Tonne-kms

Sources: Eurostat, US National Transportation Statistics, Japan MILT, Canada UN Database, New Zealand National Freight Demand Study

ship between GDP and the amount of freight movement.

The division of surface freight tonne-kms between road and rail varies widely between countries. Even within a single continent, such as Europe, countries of similar size and level of economic development can have markedly different road – rail splits (Figure 5). International variations in the modal split also reflect differences in industrial structure, the spatial distribution of population and economic activity, the relative quality and capacity of infrastructure and government transport policy.

The pronounced modal shift to road can be attributed to a range of factors, particularly:

- greater upgrading of road infrastructure in many countries
- liberalisation of road freight markets and removal of regulatory protection afforded to rail by quantitative licensing and tariff restrictions

- increases in the maximum size and weight of trucks have strengthened road's competitive advantage.

- changes in industrial structure, mainly the move from primary production to manufacturing in many developed countries. Rail commands a much smaller share of the freight market in lighter, higher value manufactured goods.

- change in the primary energy mix: in some countries the switch from coal to gas and oil has deprived rail of one of its core traffics.

- move to more flexible / JIT manufacturing: the intrinsic inflexibility and slower speed of railfreight services make them less suited to the systems of order replenishment that have evolved over the past few decades.

Many of the new production and distribution facilities constructed over the past few decades have been located too far

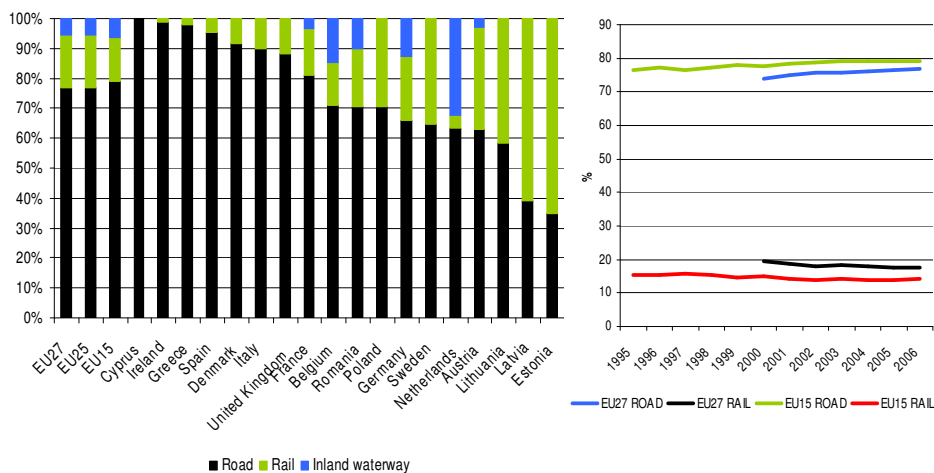


Figure 5: Road-Rail Modal Split in EU Countries 2006 (tonnes-kms) and Tonne-km Trends 1995 – 2006 (Source: Eurostat)

from railway lines to permit direct access. To capture freight traffic from these premises, rail companies must employ intermodal services comprising a rail trunkhaul and local road feeder movements. In some parts of the world, intermodal services have been one of the main growth sectors in the rail freight market. In Europe, the main growth has been in 'unaccompanied' units rather than in the movement of complete vehicles comprising tractor and trailer. Intermodal traffic has also been rising steeply in the US, with total tonnage increasing by 16.3% between 2002 and 2006 and predicted to grow by a further 73% by 2035 (US Federal Highway Administration, 2008).

Vehicle utilisation

Very little published data exists on the utilisation of road freight vehicles. Most of the available data for road is compiled by EU countries and published by Eurostat. This comprises statistics

on the distances that trucks run empty and laden. They can be used to calculate the percentage of truck-kms travelled empty and the average payload weight on laden trips (found by dividing tonne-kms by laden-kms). Only in particular countries, such as the UK, Germany and France, have surveys been done to estimate the proportion of vehicle capacity (measured by weight, cubic volume or deck area) occupied by a load.

There is general agreement that the average density of freight

moved by road is declining in many developed countries. This can be attributed mainly to the substitution of lighter materials and the greater use of packaging. This is increasing the proportion of loads 'cubing out' before they 'weigh out' and strengthening the case for volumetric measures of vehicle utilisation. Official freight surveys of surface freight transport, however, measure only the weight of goods moved. They can also contain anomalies. For example, vehicles can be considered 'loaded' when carrying empty containers / handling units.

The proportion of truck-kms run empty varies widely across Europe and averages around 25% (Figure 7). International variations can reflect differences in the size of the country, the nature of its freight market, regulatory controls and regional imbalances in freight flows. The longer the haul the greater is the financial incentive to find a backload. In larger countries,

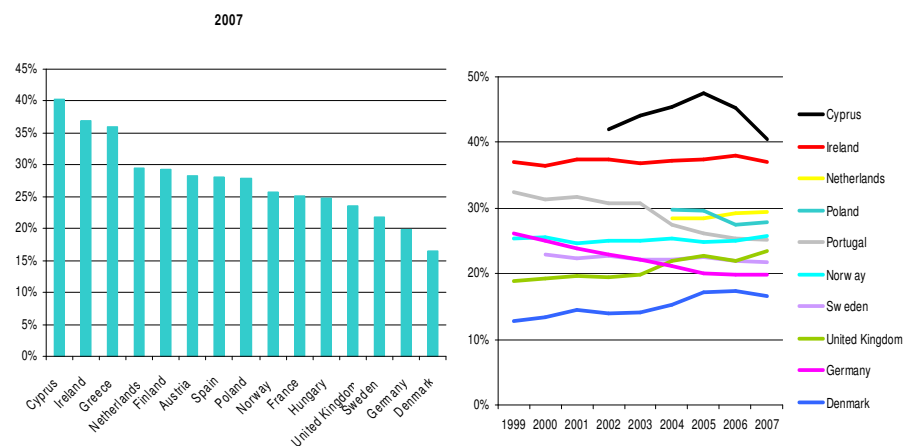


Figure 7: International Variations and Trends in Empty Running of Trucks in European Countries (Source: Eurostat)

therefore, the level of empty running tends to be lower. For example, road haulage companies in the UK have an average haul length of 101kms and on average run 27% of their kilometres empty. In contrast, J.B.Hunt one of the largest carriers in the US had an average trip length in its trucking operation in 2007 of 832kms and an average empty running figure of only 12%.

Empty running appears to be declining in most of the European countries for which data is available. The average level of empty running across eighteen EU countries dropped from 27.6% in 2004 to 27.1% in 2007. Reductions in empty running are likely to be the result of several factors including the development of load matching agencies / online freight exchanges, the strengthening flow products going back along the supply chain for recycling and remanufacture, backloading initiatives by retailers and manufacturers and the outsourcing of transport to third-party carriers.

The mean truck payload weight (in vehicles with gross weights of 3.5 tonnes or more) in the EU is 10 tonnes. The average varies enormously between member states from 7 and 16 tonnes. It is difficult to explain these wide international variations. They are likely to reflect differences in industrial structure, trading practices, past and present vehicle size and weight regulations, the nature and level of trans-

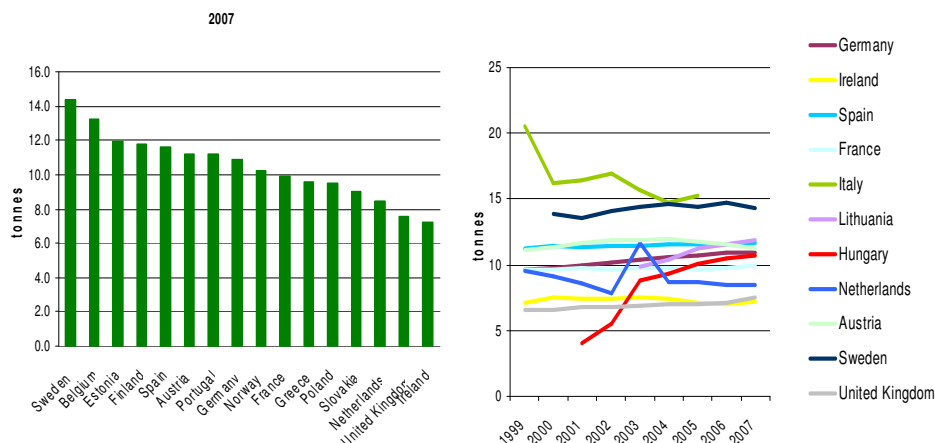


Figure 8: International Variations and Trends in Average Payload Weight on Laden Trips (Source: Eurostat)

port outsourcing and the role of wholesalers and retailers in the distribution channel. In fourteen of the 24 countries for which data is available, the average payload weight rose between 2004 and 2007 (Figure 8). Across the full sample of countries the average weight rose by 5% over this period.

Although average payload weight is often used as a surrogate measure of vehicle loading, it fails to indicate what proportion of the available carrying capacity is actually utilised. The series of eleven Transport KPI benchmarking surveys conducted in the UK in seven sectors over the past ten years probably represent the largest and most diverse source of such data. These surveys have revealed wide variations in the vehicle load factors even within reasonably homogeneous industry sub-sectors. This limited evidence suggests that significant potential exists to improve vehicle loading in the road freight sector.

Increases in the real cost of transport are forcing companies to give greater priority to the utilisation of vehicle capacity. This is exerting a strong influence on the processes relating to the scheduling of production and distribution and management of transport resources. It is tilting logistical cost trade-offs in favour of increased transport efficiency and supporting the economic case for greater investment in fleet management tools and ICT. Several developments have gathered momentum, mainly in developed countries, which can help companies achieve a step-change in vehicle utilisation:

1. *Web-based procurement of freight transport services:* an increasing proportion of freight services are being purchased online, mainly in Europe and North America, either through auction sites or, on a longer term basis, using web-enabled tendering platforms.
2. *Collaborative initiatives designed to improve the utilisation*

of logistics assets: for example, a group of major food manufacturers and distributors in the UK, under the auspices of ECR UK, set themselves the target of saving 48 million truck-miles in 2008 by sharing vehicles and promoting more efficient warehousing networks (www.igd.com). The European chemical industry is also encouraging inter-company collaboration to 'avoid unnecessary journeys' (www.cefic.be).

3. *Greater sharing of information between shippers, carriers and customers:* more open exchange of information and joint planning of transport operations across this so-called 'logistics triad' has been shown to improve vehicle load factors and cut empty running. In North America Collaborative Transportation Management (CTM) has enabled US carriers to extend their 'planning horizon' and increase utilisation of their regional truck fleets by between 10 and 42%. (Esper and Williams, 2003).

4. *Vehicle routing and scheduling software and telematics:* computerised vehicle routing and scheduling (CVRS) software helps companies to optimise the use of their vehicles with respect to various metrics, including distance travelled, driving time, vehicle loading and cost, several of which correlate closely with fuel efficiency.

Fuel efficiency

Very little published data is available showing trends in the average fuel efficiency of trucks in commercial operation. Figure 9 shows the trends for two classes of vehicle (rigids / single unit trucks and articulated / combination trucks) in the UK and US over the period since 1993. It suggests that the fuel efficiency has been increasing for articulated vehicles in the UK and single-unit trucks in the US, declining – rather erratically – for US combination trucks and remaining fairly stable for UK rigid vehicles. These average figures, however, can be distorted by changes in the size and weight distribution of vehicles within the broad rigid and articulated categories. Also over the period in question, the maximum weights and dimensions of vehicles have changed. Average fuel efficiency values are also affected by changes in the average loading of the vehicles. This casts doubt on the value of average fuel efficiency

as a performance metric for road freight operations. Energy intensity, expressed as tonne-kms per litre of fuel consumed, is a superior measure as it also takes account of vehicle loading.

The trends in the energy intensity of trucking operations in five developed countries between 1970 and 2005 show that there are substantial international differences both in the average energy intensity in 2004–5 and in the historic trends, with some countries exhibiting an upward trend in MJ per tonne-km and others a declining trend.

During the 1970s and 80s the average fuel efficiency of new heavy trucks rose at an annual rate of around 0.7%. Since the early 1990s, the rate of fuel efficiency improvement has been much slower, mainly because, since then, truck manufacturers have had to meet tightening emission standards, particularly for NOx. It has been estimated that if these controls had not

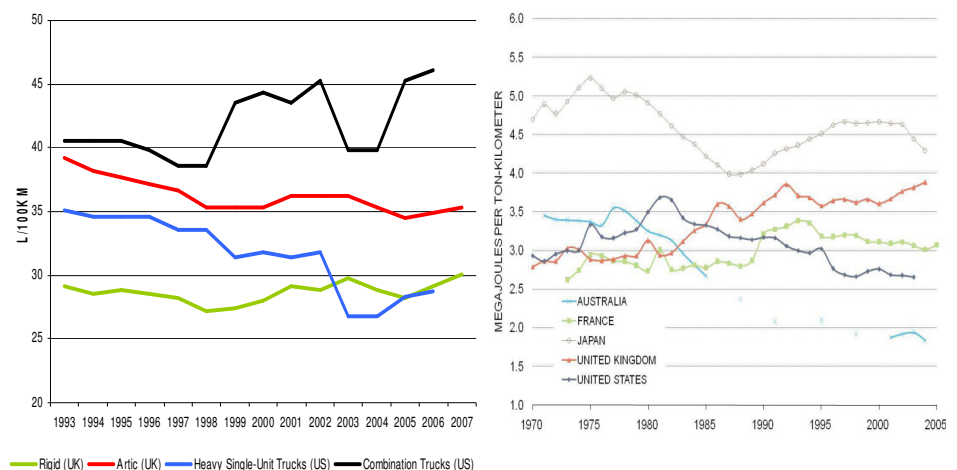


Figure 9: Fuel Efficiency of Trucks and Energy Intensity Trends in Various Countries (Source: UK Dept for Transport, Davis et al 2008, Kamakate, 2007)

been imposed, average lorry fuel efficiency today could be around 7-10% higher. It is anticipated that the introduction of the Euro 6 emission in 2013 will carry a fuel penalty of at least 2-3% and possibly as much as 8% (European Commission, 2007). In the pursuit of the environmental goal of improving local air quality, efforts to cut fuel consumption and CO₂ levels are being compromised. There, nevertheless, remains significant potential to improve the fuel efficiency of trucks even within a tight emissions regime. To date only the Japanese government has attempted to introduce a fuel economy standard for new trucks. Its 'Top runner' programme for HGVs aims to increase the fuel efficiency of new lorries by 12% between 2002 and 2015, with vehicle manufacturers' fuel consumption figures tested by means of a computer simulation model. A similar case for applying fuel economy standards to trucks is currently being evaluated in the US and the EU.

Conclusions

The framework outlined in this paper maps the complex inter-relationships between key logistics variables determining the total energy requirements of road freight transport. Trends in the key drivers of changes in energy use, i.e. freight transport intensity, modal split, average vehicle utilisation and fuel efficiency are reviewed for countries where adequate data sets are available. The analysis re-

veals wide variations between reporting countries, even within the same continent. Also, while trends in some of the variables reduce the overall energy requirements of road freight transport (e.g. improvements in vehicle utilisation or fuel efficiency of trucks), changes in the others result in the opposite effect (e.g. diversion of freight from rail to road transport, strong link between GDP growth and transport intensity of national economies). Hence, it is very difficult to quantify the overall demand for road freight-related energy based solely on changes in the individual variables. However, disaggregated analysis enables better understanding of causes and drivers underlying this demand. This paper provides a robust framework for the development of transport policies designed to reduce the future energy requirements of road freight transport.

References

- Bennathan, E., Fraser, J. and Thompson, L.S. (1992), 'What Determines Demand for Freight Transport'. Working paper WPS 998, World Bank, Washington DC.
- Davis, S.C., Diegel, S.W. and Boundy, R.G. (2008), 'Transportation Energy Data Book' 27th Edition, Oakridge National Laboratory.
- Dicken, P. (2007), 'Global Shift: Mapping the Changing Contours of the World Economy' Sage.
- Esper, T.L., Williams, L.R. (2003), 'The Value of Collaborative Transportation Management (CTM): Its relationship to CPFR and Information Technology', *Transportation Journal*, Vol. 42 No. 4, pp. 55-65.
- Eurostat (2007), EU transport statistics website: <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>
- Farahmand-Razavi, A (2008) 'Land Transport Options between Europe and Asia' Presentation to Worldnet Beijing workshop, May 8th.
- Kamakate, F (2007) 'Understanding Current and Future Trends in Energy Intensity from Heavy Duty Trucks' Presentation to International Workshop on Fuel Efficiency Policies for Heavy Duty Vehicles, IEA Paris, 22nd June.
- McKinnon, A.C. (2007) 'The Decoupling of Road Freight Transport and Economic Growth Trends in the UK: An Exploratory Analysis' *Transport Reviews*, Vol. 27 No.1, pp. 37-64.
- McKinnon, A.C. and Piecyk, M.I. (2008) 'Decoupling, recoupling and the future growth of road freight', *Logistics & Transport Focus*, Vol. 10 No.12, pp. 40-46.
- UK Department for Transport (2008) 'Road Freight Statistics 2007' London.
- US Federal Highway Administration (2008) 'Freight Facts and Figures 2007' Washington DC.

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Towards Sustainability in Transport: The Need for Environmental Management Systems for Small to Mid-Size Third Party Logistics Providers

By Christopher Kelleher

Introduction

Climate change, the stability of the ozone layer, and the increasing pressure on companies to reduce their waste and pollution has come to the forefront of political discussions and academic research alike. The rate at which pollution and greenhouse gas (GHG) emissions have increased over the past decades is staggering, and the levels are only increasing. GHG, such as CO₂ emissions, have been directly related towards climate change and it now falls under the responsibility of all business owners to not only manage their businesses, but also their social responsibility to the environment. A large percentage of the pollution every year is from the transportation and logistics sector, so it is important for third-party logistics (TPL) companies to manage their carbon footprints effectively. Environmental management systems (EMS) are a well established method for managing waste outputs while staying competitive. However it can be difficult for many companies to find the required resources available. Therefore, the question that arises is, "should TPLs incorporate EMSs into their business strategies?"

This article will focus on whether or not TPLs should incorporate an EMS, and provide propositions for further research into several different specific areas of this question. The answers to these questions will help business leaders and owners understand the need for sustainability, as well as the consequences for incorporating an EMS into a TPL company.

This article will begin with a review of the available literature examining what exactly the term TPL entails, including the different subcategories and services offered by this business sector. Maja I. Piecyk and Alan C. McKinnon are based at the Logistics Research Centre (LRC) at Heriot-Watt University in Edinburgh.

An explanation will then follow of the various forms of EMSs that a company can implement, as well as the need for sustainability in today's economy. In order to establish whether incorporation will prove useful, the potential benefits from implementing an EMS into a TPL company will be examined, as well as possible obstacles and barriers.

Third-party logistics: an overview

Third-party logistics (TPL) has become an increasingly popular topic among scholars and businesses alike over the past few decades. However, academics and researchers have varying descriptions of what exactly a TPL relationship entails. The terminology as well as the actual bounds of the agreements committed to by supplier and buyer can vary widely. Lieb (1992, p. 29) explains that TPLs involve "...the use of external companies to perform logistics functions that have been traditionally been performed within an organization." This explanation is brief and does not quite cover the full premise of what exactly TPLs are, including the relationship between companies, length of contracts, or types of services involved. Skjoett-Larsen (2000) believes that in order to classify a relationship between the seller and provider as a TPL, certain conditions must be met. These include a broad range of services, a long-term duration, joint efforts to develop cooperation, a fair sharing of risks and benefits, and also that the TPL incorporates strategic as well as tactical dimensions. Another definition depicts a more com-

plete picture, describing TPLs as “relationships between interfaces in the supply chain and third-party logistics providers, where logistics services are offered, from basic to customized ones, in a shorter or longer-term relationship, with the aim of effectiveness and efficiency” (Bask, 2001, p. 474). This definition goes above and beyond the simplistic version by Lieb to show that the TPL concept involves partnerships with efficiency and productivity in mind, with loose limitations on what is required for the classification of a TPL. TPLs can contribute a vast array of services to potential partners. These can include,

[...] several types of brokerage, forwarding, freight consolidation, warehousing, information processing services (including freight bill auditing and payment, tracking, EDI, transaction processing, MIS reporting, etc.), and fleet operations (vehicle leasing and management, container control, intermodal trailer operations, etc (Sheffi, 1990, p. 27).

Along with these services, there are many other reasons why it can be beneficial to engage in a contractual partnership with a TPL provider. The benefits include, but are not limited to, reduced logistics costs, higher levels of customer service, reduced investment in facilities and other resources, increased access to new technologies and information, and improved flexibility and productivity (Marasco,

2008). With the vast amount of service options and benefits associated with outsourcing, TPLs can look very attractive to a struggling company without the resources to adequately manage their own logistics division.

With all of the advantages involved with outsourcing a company’s logistics activities, it should be noted that a business must not jump to conclusions about how to find and create a lasting and effective partnership. There are five distinct stages, according to Sink and Langley (1997), to determining why and how a company should find a partner. These steps are:

1. Identify the need to outsource logistics.
2. Develop feasible alternatives.
3. Evaluate and select a supplier.
4. Implement their service.
5. Conduct an ongoing assessment of the partnership.

TPLs have experienced steady growth for several reasons, including internal and external factors related to the industry and economy. For example, the competition at the worldwide level

has grown exponentially in recent years. The advancements in computers and technology also extend more pressure onto a company’s supply chains by allowing faster transfer of information and resources. However, instead of investing extra capital and money into their own logistics sectors, many of these companies have instead decided to focus on their own core values, thus looking to outsource their logistics needs. This gap has left TPL companies to flourish in the wake of an ever increasing market size (Sheffi, 1990).

TPLs can vary widely in terms of the size of the company. For this paper, TPLs will be divided into two categories, that of small to midsize enterprises (SME) and large enterprises (LE) as shown in Figure 1.

According to the European Commission’s current definition, an SME has less than 250 employees and a turnover of less than €50 million or a balance sheet total of less than €43 million, whereas an LE is anything above these statistics (EC 2009). SMEs are generally orga-

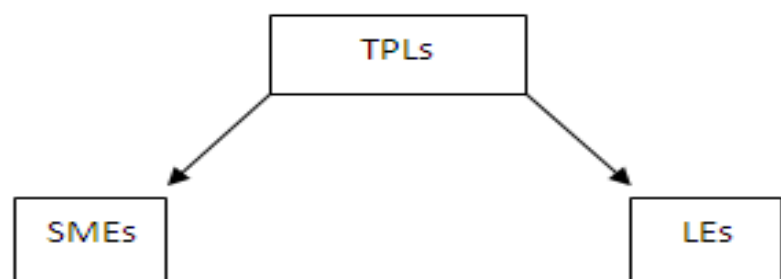


Figure 1

nized more informally (Spence, 1999) and also do not necessarily have specialized staff for every department (Fassin, 2008). SMEs are already, "...generally less well equipped to face increases in international trade" (Julien et al, 1994, p. 52), and thus it is difficult for these small TPLs to compete with LEs and multinational corporations. Even though SMEs are smaller than the larger companies, they still play an integral role in the economy. Of European enterprises, 99.8% are SMEs, and they account for 66% of total employment and half of the total value added in the EU (Baden 2008; EC 2003). It also, "...has been estimated that SMEs have a greater environmental impact per unit than large firms and are the largest contributors to pollution, carbon dioxide emissions and commercial waste" (Baden, 2008; Environment Agency, 2003). Therefore, it is important for small TPLs to be conscious of their waste and pollutant outputs, and create an environmentally sustainable business strategy.

Environmental sustainability in transportation

As supply chains are becoming stretched further and further apart geographically, there is ever increasing pressure on TPLs for accurate and timely service. However, this also implies that travel times are increasing, as well as the total amount of vehicles on the roads or other modes of transportation.



Managers are now faced not only with making day-to-day decisions about their suppliers and customers, but also about their company's green practices, as well as their social responsibility to sustainability and the environment.

The term "green" has become enormously popular among governments and corporations alike. In essence, the phrase "going green" refers to a person's or company's efforts to reduce their carbon footprint by implementing strategies or tools to reduce pollution and waste on a daily basis. This idea has come from research concluding that humans are massively polluting the atmosphere - and an international response is required (Levy, 1997). Ozone depletion and climate change are the major drivers for green practices, where ozone depletion is caused by chlorofluorocarbons and climate change by greenhouse gases (GHG) (Levy, 1997). Every industry has some

effect on the environment, and thus it is increasingly important for companies to consider green practices as well as sustainability.

Sustainable development, as defined by the 1987 Brundtland Commission Report, is "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition, although valuable, describes sustainability broadly in terms of development. According to Goodland (1995), sustainable development can be broken down into three segments; economic, social, and environmental sustainability. The part that is most prevalent for the issue at hand is that of environmental sustainability, which "seeks to improve human welfare by protecting the sources of raw materials used for human needs and ensuring that the sinks for human wastes are not exceeded" (Goodland, 1995,

p. 3). From a company's standpoint, it is imperative to create a successful business without overly consuming resources, which can detriment future generations.

But where can a company begin to consider environmental sustainability when it has no experience? This can be a difficult task, especially when there are so many different reasons for why a company may be considering developing a policy of this kind. Internationally, many countries have differing opinions on the need to be actively involved with green practices. A study by Corbett and Kirsch (2001, p. 332) found that in recently developed countries, such as Taiwan and Brazil, more people are becoming environmentally conscious, but the environmental enforcement is "lax". It was also noted that there is a "...growing public dissatisfaction with environmental effects of rapid development and desire on the part of individuals and firms to 'do something positive' for the environment" (Corbett, 2001). However

in developed countries, such as the US, companies agreed that there is an importance to green policies and procedures, but "...environmental awareness was more of a given" (Corbett, 2001, p. 332). Although these observations are very broad, they can be examined country-by-country for a more detailed point of view. For example, if a country has strict laws and regulations enforcing environmental responsibility, a company may be more inclined to consider an extensive environmental management system (EMS) in order to comply with all rules or laws in effect, as well as monitor their own carbon footprints.

Environmental management systems (EMS)

According to Melnyk (2003, p. 332), an EMS involves:

"...the formal system and database which integrates procedures and processes for the training of personnel, monitoring, summarizing, and reporting of specialized environmental performance informa-

tion to internal and external stakeholders of the firm."

Internally, the EMS focuses on design, pollution control and efforts to minimize waste. Externally, it provides stakeholders with information regarding performance, as well as helping to create a positive company image (Melnyk, 2003). Each of these potential benefits will be considered in further detail in later sections.

A company may choose to have its EMS certified by a national or international standard once the formal EMS is in place. One example of a standard of certification is ISO 14001, created by the International Organization for Standardization, which is a:

"...comprehensive Total Quality Environmental Management (TQEM) system which integrates the basic components of environmental marketing (environmental labeling, life-cycle assessment, and environmental design) with Total Quality Management" (Miles et al, 1997, p. 165).

In other words, "...ISO 14000 is a generic description for a series of 20 standards and guidelines" (Hersey, 1998, p. 26). This international standard allows for businesses around the world to prove that they are environmentally conscious to each other, their governments, and their customers. By doing so, many benefits can be realized



other than those derived from just creating a formalized EMS. For example, the need to comply with laws and regulations has been noted as one of the main drivers for a company to implement the ISO standard, however for other companies, it can be just to meet customer demands based on their requirements (Nawrocka, 2009). Begley (1996, p. 51) continues by explaining that it can also help to,

[...] diminish barriers to trade and make it easier to business across borders, both for importing and exporting companies and for multinationals that operate worldwide. The standardized system also promises to make it easier for companies to gauge their environmental performance and make useful comparisons of facilities in different countries.

It is therefore apparent that there are three different segments of companies based on what kind of EMS system is in place. The first segment is those

companies that do not have a formal EMS system. They may try to be environmentally conscious or have some guidelines for waste reduction, but no official system for documentation and training. The next segment is companies that have a formal EMS in place, although it has not been certified by a national or international standard, such as ISO 14001. Finally, the last segment includes those companies that have a formal, certified EMS.

Exploratory research by NITL into the use of EMS in TPLs suggests that the great majority of firms in Ireland are in the first category.

Future directions

While it is undoubtedly important for a company to monitor and control its negative effects on the environment, it is impossible to expect every company to make an active effort towards doing so without knowing that there will be potential benefits involved. These benefits can be as simple as reducing

ones carbon footprint, to the more complex financial benefits associated with marketing attempts and refunds from recycled waste. Unfortunately, there is a lack of essential research based on these particular questions as they relate to small to midsize TPLs. Therefore, future research is necessary for academia and business leaders and managers around the world to make accurate and valuable decisions for their enterprises.

According to Hillary (2004), there are external and internal benefits that a small to midsize TPL can potentially achieve from adopting an EMS. External benefits are those that affect, "the external interactions of an SME" (Hillary, 2004, p. 563). Furthermore, this category can be separated into three groups: commercial, environmental, and communication benefits. Commercial benefits include meeting customer's demands, finding and developing new business partners (for TPLs, buyers or sellers who require a shipper), and diminished barriers to trade. Benefits included within the environmental category include increased ability to monitor and limit waste and pollution and comply with governmental laws and regulations concerning the environment. Finally, communication benefits include improvements in supply chain communications, enhanced company image, and improved communications with stakeholders (Hillary, 2004).

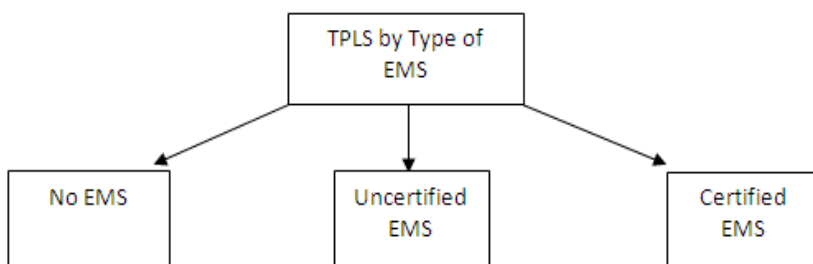


Figure 2

Internal benefits can be described as positive outcomes that are related to the in-house operations of the company (Hillary, 2004). As Hillary (2004) explains, there are three segments of internal benefits - organizational, financial and people benefits. Organizational benefits include those directly related to the organization of the company, such as training, improved procedures, and enhanced management techniques. Financial benefits are those directly associated with a company's balance sheet or income statement, including profits, cost reduction, etc. People benefits are those that relate to the employees or managers, thus the human capital involved in a company. These benefits include improved morale, increased skills from training, and diminished communication barriers among management and employees (Hillary, 2004).

Even though the vast array of benefits may be attractive, there are also many reasons for why a small to midsize TPL may not be able to implement an EMS. This is simply because most companies in this category may not have enough resources available to devote to developing an EMS into their business strategies. The term resources not only refer to financial means, but also human capital. A lack of expertise or skill on the part of the manager or employees can be a major barrier. For small companies, the owner-manager is concerned with day-to-day activities to ensure that

the company will be open the following day!. Therefore it can be very difficult to find the time to dedicate to developing the EMS. If the time is not available, a consultant can be brought in to help with the transition, but this can become very costly. Small to midsize TPLs typically do not have large cash reserves available for certifications or management systems, and especially ones that are not immediately essential to the survival of the company (Keasey, 1993; Spence, 1999). The barriers to adoption are numerous, and the ones presented here are not exhaustive of all potential reasons.

Conclusion

Going green is quickly becoming necessary for companies around the world in order to stay competitive against each other, keep up with increasingly more demanding customers, and to satisfy all governmental regulations. As discussed, EMSs, formal or informal, can be greatly beneficial for companies that both have had some form of environmental policy and those that have never tried before. The benefits can be attractive, but it is important that companies develop an EMS for the right reasons. This includes of course improving a company's carbon footprint, reducing waste and pollution, and increasing recycling. There are companies that attempt to reap the benefits without doing anything about their policies. There is a term

called 'greenwashing' which is where "...more money is spent promoting a company's or product's green credentials than is spent on actually being green" (Baden, 2009, p. 431). There is a fine line between using green practices solely as a marketing ploy or as advertising since promoting one's own environmentally friendly policies to customers is not only expected, it may be demanded. However false advertising claims of this kind are very rare, and therefore the pressure is put onto the suppliers and customers to judge. Research is needed in this area from a legal as well as a moral standpoint.

Regardless of a company's reasoning, the effort put forth is recognized by business partners across the supply chain, as well as their customers. Green practices are a continuously improving process however, so it is also important for companies to continue their efforts to reduce their waste and pollution as it is a never ending venture.

References

- Baden D A, Harwood I A, Woodward D G (2009) The Effect of Buyer Pressure on Suppliers in SMEs to Demonstrate CSR Practices: An Added Incentive or Counter Productive? *European Management Journal*, 27, 429-41.
- Bask A H (2001) Relationships Among TPL Providers and Members of Supply Chains – A Strategic Prospective. *Journal of Business and Industrial Marketing*, 16 (6), 470-86.

- Bruntland G (1987) *Our Common Future: The World Commission on Environment and Development*, Oxford: Oxford University Press.
- Corbett C J, Kirsch D A (2001) International Diffusion of ISO 14000 Certification. *Production and Operations Management*, 10 (3), 327-42.
- Environment Agency (2003) *SME -Environment 2003*. Environment Agency – Net-regs.
- European Commission (2003) *SMEs in Europe 2003. Observatory of European SMEs*, 7, 1-92.
- Fassin Y (2008) SMEs and the Fallacy of Formalising CSR. *Business Ethics: A European Review*, 17 (4), 364-78.
- Goodland R (1995) The Concept of Environmental Sustainability. *Annual Review of Ecology and Systematics*, 26, 1-24.
- Hersey K (1998) A Close Look at ISO 14000. *Professional Safety*, 43 (7), 26-29.
- Hillary R (2004) Environmental Management Systems and the Smaller Enterprise. *Journal of Cleaner Production*, 12, 561-69.
- Julien P, Joyal A, Deshaies L (1994) SMEs and International Competition: Free Trade Agreement or Globalization. *Journal of Small Business Management*, 32 (3), 2-63.
- Keasey K, Watson R (1993) *Small firm management: ownership, finance and performance*. Oxford: Blackwell.
- Levy D (1997) Business and International Environmental Treaties: Ozone Depletion and Climate Change. *California Management Review*, 39 (3), 72-85.
- Lieb R C (1992) The Use of Third-Party Logistics Services By Large American Manufacturers. *Journal of Business Logistics*, 13 (2), 29-42.
- Marasco A (2008) Third-Party Logistics: A Literature Review. *International Journal of Production Economics*, 113, 127-47.



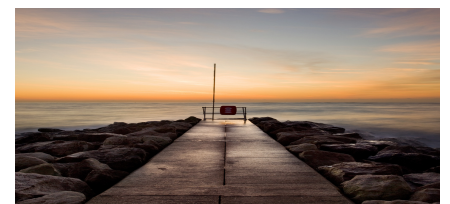
International Journal of Production Economics, 113, 127-47.

- Melnyk S, Sroufe R, Calantone R (2003) Assessing the Impact of Environmental Management Systems on Corporate and Environmental Performance. *Journal of Operations Management*, 21, 329-51.
- Miles M, Russell G (1997) ISO 14000 Total Quality Environmental Management: The Integration of Environmental Marketing, Total Quality Management, and Corporate Environmental Policy. *Journal of Quality Management*, 2 (1), 151-168.
- Nawrocka D, Brorson, T, Lindhqvist T (2009) ISO 14001 in Environmental Supply Chain Practices. *Journal of Cleaner Production*, 17, 1435-1443.
- Sink H L, Langley C J (1997) A Managerial Framework for the Acquisition of Third-Party Logistics Services. *Journal of Business Logistics*, 18 (2), 163-89.
- Sheffi Y (1990) Third-Party Logistics: Present and Future Prospects. *Journal of Business Logistics*, 11 (2), 27-35.
- Skjoett-Larsen T (2000) Third-Party Logistics – From an Inter-Organizational Point of View. *International Journal of Physical Distribution and Logistics Management*, 30 (2), 112-27.

national Journal of Physical Distribution and Logistics Management, 30 (2), 112-27.

- Spence L J (1999) Does Size Matter? The State of the Art in Small Business Ethics. *Business Ethics: A European Review*, 8 (3) 163-74.
- Sroufe R (2000) *Environmental Management Systems: Implications for Operations Management and Firm Performance*. Ph.D. Dissertation. Michigan State University, Michigan.

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Towards a Greener Irish Supply Chain: a rail freight perspective

By Juan Carlos Carrasco Giménez

Introduction

With the aim of achieving the goal of supply chain and transport's sustainability, European's policy makers established a list of guidelines collected in the EU White Paper, *Transport Policy for 2010: Time to Decide*. Focusing on freight movement, there is a mode of transport which has to increase its market share in order to reduce CO₂ emissions which is namely the train.

As the White Paper notes: "train is a mixture of ancient and modern". Modern high speed trains live with old and decrepit freight and suburban lines. Regarding freight transport, rail is the only mode of transport called to increase its market share. While rail haulage has been decreasing in Europe, it has been flourishing in the US with a market share close to 40% (compared to a decline in Europe to 8.4% of total freight).

The Challenge

In a global environment where demand for freight transportation is in continuous growth, development of more efficient methods of transport is essential. The EU White Paper suggests that renewal of railways is the key to achieving modal re-balance. Objectives fixed for railways in 2020 in the Paper

are:

- increase its market share of goods traffic from current 8% to 15%;
- a trebling of manpower productivity on the railways;
- a 50% gain energy efficiency;
- a 50 % reduction in emissions of pollutants; and,
- An increase in infrastructure capacity commensurate with traffic targets.

However, this measure not only has not been followed in Ireland but rail freight transport has been continuously decreasing.

A Brief Review of the Irish Rail Network

The first idea of railway construction emerged in 1825 (the same year as Britain's first locomotive drawn-line) although it was not until the 17th of December in 1834 when the first line (between Dublin and Kingstown) was opened. During 1840s Irish Railway development was highly influenced by the spread of railways in Great Britain. By 1853 there were 1,352 route kilometres of railway opened in Ireland. By 1872 railway kilometres had risen to 3,365 and continued its expansion until the peak of 5,539 km approached in 1920.

Although Railway infrastructure was immersed in a slow but constant development this suddenly

changed after 1920. Some lines were dismantled as a result of lack of use. By 1939 the length of routes was about 5,123 km and continuing its reduction, reaching 5,074 by 1946 and 4,115 in 1957. Finally, a negligible length, in comparison with earlier times, of 1,834 km was operative by 2007.

The Irish Government has made the effort of investing a large budget through the Transport National Development Plan (*Transport21*). Although improvements in signalling and rolling stock have been achieved, the length of track has not increased to any significant extent.

Current Irish Rail Freight Service

The market share of rail freight in Ireland has been suffering a dramatic in recent years. It currently represents just 0.6% of the total haulage carried in the Republic of Ireland. The current main customers of Irish Rail Freight are reduced so just four companies: Boliden, DFDS, IWT and Coillte. The level of rail freight usage is shown in Table 1 below.

Boliden: Transportation of lead from Tara Mines located in Navan to Dublin Port. (Three trains per day carrying a total weight of 400,000 tonnes per annum.)

DFDS: Having taken over Norfolk line and carrying three trains per week from Ballina to Waterford Port.

IWT: Three trains per week from Ballina to Dublin Port.

Coillte: Two transportation routes are used. Firstly, a route from Ballina to Waterford depot, with a level of service of two trains per week. Secondly, trains going two days per week from Wexford to Waterford depot. In both cases haulage must be transported by road from Waterford depot to the Smart Ply manufacturing plant. Coillte pays for road transport at both ends since Iarnród Éireann provides rail transport only.

Table 1: Current Irish Rail freight Customers

Current Rail Freight Policy

Rail freight policy is the key issue to guarantee the future of rail freight transportation in Ireland. The key stakeholders in this field in the Republic of Ireland are Irish Government, Iarnród Éireann and the European Union. The latter has demonstrated a commitment to developing a scenario where the railway can compete against other modes of transport. What about the other two stakeholders?

The Irish Government has funded a huge investment programme - *Transport21* - aimed at the development of the Irish transportation network including railways for the movement of both passengers and freight. The total budget of *Transport21* is €34 billion over the period 2006 to 2015.

Iarnród Éireann is receiving a record investment for upgrading the intercity rail network as well as new and expanded commuter rail services in Dublin,

Cork and Galway. Other actions comprise the re-opening of the Navan rail line and the Western Rail Corridor from Ennis to Claremorris. All this investment has been useful as a measure to revamp and improve a deteriorated rail network that was highlighted by the derailment of a passenger train at Knockcroghery on the Dublin-Westport line in November 1997. In this way, Irish Government included a railway safety programme in *Transport21*. As stated in *Transport21* portfolio:

the purpose of the investment is to improve all aspects of safety across the Iarnród Éireann network and to keep risk levels as low as is reasonably practicable.

Although the previous paragraph seems to introduce a fantastic scenario for rail in Ireland, it is only true regarding passenger services. Facts show that there has been a trend to promote passenger services over freight by the Irish Government in re-

cent years. As is pointed out by McEneaney (2005), Iarnród Éireann could be operating with Lisheen Mines today as it has in the past with Tara Mines. The company approached Iarnród Éireann with the objective of signing a contract to transport zinc by rail from the mine to Cork Port. An investment of €10 million was required in the region to make it possible but the Government stated that they could not interfere in commercial arrangements. Surprisingly, instead an investment was made to build a road to facilitate lorry access to the mine. Furthermore, Irish Government is not providing any type of grant to support rail freight in the country.

However, this policy could change in the following months since Irish Government has announced in its *Renewed Programme for Government* that an allowance per tonne for rail freight will be introduced in line with climate change objectives. This could be an opportunity to recommence a debate about the future of rail freight transport in Ireland.

The objective set by the Government is to reduce losses and provide a breakeven service on the freight side. During a meeting with General Manager of Iarnród Éireann Freight, Stephen Aherne, he stated that Iarnród Éireann Freight will make a positive contribution to overheads this year after many years of losses, which would

contribute to the achievement of the objective set by Government policy. Reasons for these poor economic results on the freight side are mainly because in Ireland most freight needs to be delivered over relatively short distances from the sea-ports - this is highly uncompetitive for rail. This matter was pointed out both by Stephen Aherne and Harry McGeehan, Senior Economist of Córas Iompair Éireann and, it is also highlighted in the rail freight survey of the Central Statistic Office (CSO). Furthermore, there is another key issue in Ireland which is the lack of heavy industry requiring the transportation of high volumes of freight.

Stephen Aherne also pointed out during the meeting another fact which is that Iarnród Éireann Freight shares locomotives and drivers with Iarnród Éireann Passenger. Due to the priority of this service over freight, Irish Rail's company policy dictates that the passenger business has a priority when it comes to the availability of drivers and locomotives.

As stated by John Harvey, rail transport lecturer at the Dublin Institute of Technology, "Government want people to commute to work using public transport". Frequent delays in passenger services would result in a lack of future demand and the shift of people to alternative modes of transport.

Comparing Road and Freight Development in Ireland

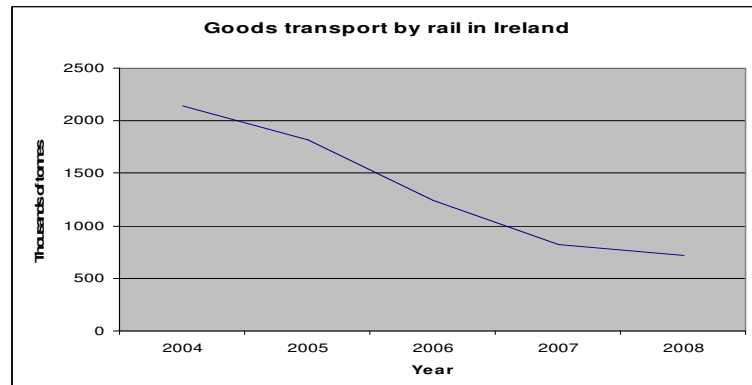


Figure 1: Good Transported by Rail in Ireland

The quantity of freight transported by rail in Ireland has been decreasing as can be seen in Figure 1.

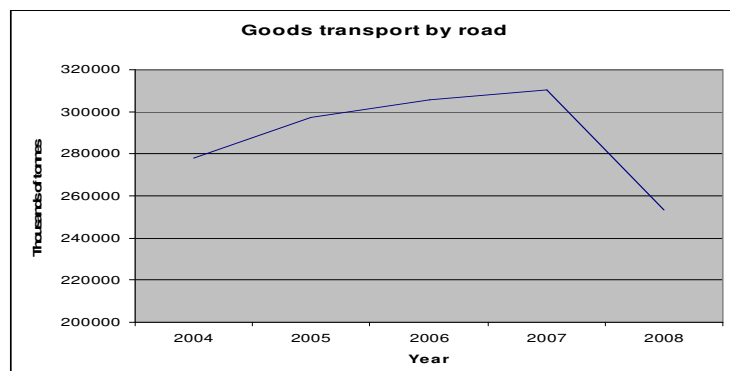


Figure 2: Good Transported by Road in Ireland

If we compare this with the evolution of road haulage in the Republic of Ireland we will see how the trend is a continuous shift of freight from rail to road – see Figure 2.

In recent years both road and rail have experienced an increase in the amount of money invested to enhance the infrastructure of transport in Ireland

as is shown in Figure 3. Rail has been revitalized from post 1920s

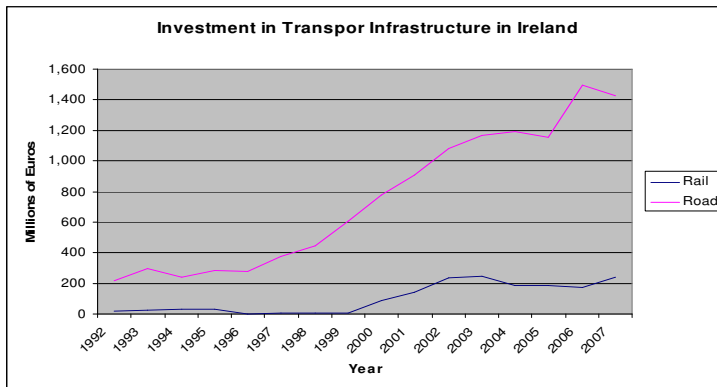


Figure 3: Investment in Transport Infrastructure in Ireland

dismantling process having received strong investment during Celtic Tiger Years which helped to revamp the system with new rolling stock and electrical signaling among other things.

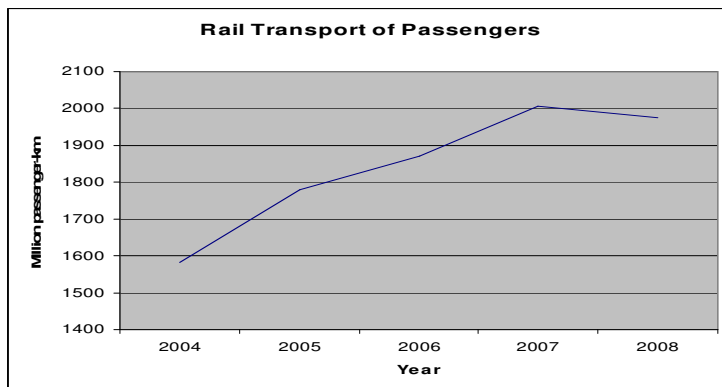


Figure 4: Rail Passenger Transport

If there is an existing investment in rail transport and freight is not being improved, the question is: what is the aim of such investment? This is answered to some extent in Figure 4.

Summarizing, this is the demonstration of what was introduced earlier in this article in relation to Government support for pas-

senger and freight transport by rail.

Barriers to Rail Freight Development: external costs, rules enforcement and industry location

When transporting goods by road there are additional costs associated with it (i.e. apart from the normal cost of the trip) which have to be paid by society. These costs, known as “externalities”, are seriously high in the transport industry. The report *The Way to Sustainable Mobility*, based on an INFRAS/IWW study of 1995 which examined 17 European countries, concluded that “The external costs of transport, excluding congestion, stand at €530 billion, almost 92% of which can be attributed to road alone”. The new INFRAS study claims that external costs rose over 12% between 1995 and 2000 and in 2004 they account for 7.3% of the GDP in Europe. As mentioned in the text: “over 80% of these costs are due to road transport, 1.9% to rail”

These external costs consist of accidents, air pollution, climate change, noise, and congestion. Railways’ external costs are much lower compared with road haulage. For instance, number of victims in road transport in Ireland from 2006 to 2007 was 703 and 4 in rail transport over the same period. Furthermore, trains are more energy efficient than trucks with the consequent reduction in

pollutant emissions helping to develop a greener and move sustainable future in relation to climate change. If all these costs were included in the fare of road hauliers, rail freight would become more competitive.

Finally, as Howard Knott, Trade Facilitator of the Irish Exporters Association, suggested in a meeting, one of the big problems about the efficiency of rail freight in Ireland is that manufacturing plants are not conveniently located for possible connectivity with the rail network. This makes it more difficult to achieve competitive rail freight transportation since this service can not be provided as a door-to-door service as road hauliers do. This is critical when transporting timber as it is currently happening with Coillte.

Conclusions

Through the results and meetings introduced in this article, a general overview of rail freight transportation in Ireland has been provided. The most noteworthy issue is that rail freight service is suffering a continuous decrease in its market share in favour of road haulage. General handicaps regarding rail freight development are the lack of support from the Government and the lack of heavy industry requiring high volumes of

freight movement. Furthermore, a high percentage of goods arriving at seaports are distributed in areas close to them, making it more difficult for rail freight to compete. The general feeling amongst key stakeholders interviewed by the author is that rail freight development in Ireland is in danger and needs Government support with more emphasis than in other European countries. Lack of planning in this matter might incur high risks to the country in the future.

References

- European Commission of Mobility & Transport. White Paper- European Transport
- Policy for 2010: Time to Decide // <http://ec.europa.eu/transport/strategies/>
- 2001_white_paper_en.htm
- Meeting with John Harvey, Railway Lecturer at Dublin Institute of Technology, Faculty of Engineering, Dublin, (17 June 2010).
- Meeting with Harry McGeehan, Senior Economist of Córas Iompair Éireann, CIE Headquarters, Dublin, (12 July 2010).
- Meeting with Stephen Aherne, Manager of Iarnród Éireann Freight, Iarnród Éireann, Dun Laoghaire Railway Station, Dun Laoghaire (9 August 2010).
- Meeting with Howard Knott, Trade Facilitator of Irish Exporter Association, IEA, National Institute for Transport and Logistics, Dublin (16 August 2010).
- Casserley, H.C., (1974), *Outline of Irish Railway History*. Newton Abbot: David & Charles Ltd.
- InterTradelreland (2008). *Freight Transport Report for the Island of Ireland*. Newry: The Trade and Business Development Body.
- International Union of Railways (2000). *The way to sustainable mobility: cutting the external costs of transport*. Paris.
- Central Statistic Office (2008). *Freight Transport Survey for 2008*. Dublin: CSO.
- Mc Eneaney, S. (2005) *An Analysis of Rail Freight Transport in Ireland*, B.Sc. (In Transport Technology) unpublished dissertation, Dublin Institute of Technology, Dublin.
- Renewed Programme for Government (2009). Irish Government // http://www.taoiseach.gov.ie/eng/Publications/Publications_2009/Re-newed_Programme_for_Government_October_2009.pdf
- INFRAS and IWW Institutes (2004). *The true costs of transport-Time to act*. Paris.
- KSA, Imrecom and Fisher Associates. Socio-Economic and Business Case for the Maintenance of the Rosslare-Limerick-Waterfor Rail Corridor.

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The Role of Sustainability in SCM

The Case of the Sustainable Packaging Supply Chain

By Edward Sweeney, NITL

This article introduces the role of supply chain management (SCM) as a means of eliminating waste in supply chains. It goes on to examine the implications of the increased focus on sustainable packaging for the design and management of packaging supply chains.

Supply chain management (SCM) is the integrated management of all activities from the source of raw materials through to delivery of the product or service to the final customer. It is concerned with ensuring that traditional approaches to managing companies – often characterised by fragmentation – is replaced by more integrated and holistic approaches. This means thinking beyond traditional functional and company boundaries and focusing on those processes that genuinely add value from a customer point of view. Most companies have a relatively small number of high level core business processes that create customer value and enhance shareholder value as a consequence.

Traditionally, SCM has been concerned with the achievement of two main objectives:

- Meeting (or exceeding) customer service requirements in targeted markets or market segments; and,
- Optimising total supply chain

investment and cost.

Through the achievement of these objectives customers can be satisfied in a manner which creates profit and shareholder value. The focus of SCM on the creation and delivery of value is aimed at ensuring that market requirements are met in a consistent manner. Thus, understanding customer service requirements in targeted markets or market segments “sets the spec” for integrated SCM. In relation to financial dimension, the optimisation of supply chain costs requires that waste be eliminated throughout the chain. For example, the well known Toyota Production System (TPS), and the associated just-in-time (JIT) paradigm, is fundamentally concerned with the elimination of “muda” (the Japanese word for waste). However, SCM’s focus on value creation suggests that a focus on non value-adding activities (NVAs) might be instructive.

An NVA may be defined as any activity (or resource or asset) anywhere in the supply chain which is adding cost but not necessarily adding value from a customer perspective. Given its central focus on the optimisation of total supply chain costs, the identification and minimisation of these NVAs is a key SCM

issue. Another approach to defining an NVA is that it is any activity (or resource or asset) anywhere in the supply chain which is adding *time* but not necessarily adding value from a customer perspective. Many world class companies have recognised that defining an NVA in this way facilitates the simultaneous achievement of the customer service and financial objectives set out earlier. This is important as these objectives were often seen as mutually exclusive in that:

- increased costs and/or upfront investment were regarded as essential if customer service performance was to be improved; and,
- reducing costs was deemed to impact negatively on customer service performance.

By using time-based approaches to managing the supply chain, and by focusing on the development and implementation of appropriate time compression strategies throughout the supply chain, customer service performance can be improved (e.g. through shorter order to delivery cycle times) and costs reduced (as *time is money!*) at the same time.

However, whilst the foregoing has been adopted and implemented in many leading edge organisations in recent decades,

we are now living in a new era as a result of a variety of separate but interrelated factors, including:

- the growth of international (and even global) business and the concomitant globalisation of supply chains;
- the development of highly virtual supply chain architectures as a consequence of the outsourcing of supply chain activities deemed to be “non-core”; and,
- increasing awareness of the impact of business activity on environmental degradation.

The latter has sharpened the focus of firms on the need for more sustainable business models and more sustainable supply chain practices. It is the focus of the remainder of this article.

In recent years a growing acceptance has developed that society is facing a number of critical environmental challenges that require major changes in the way in which societies and their national economies, as well as individual firms and their supply chains, are organised. In some cases the environment is degraded by various business activities in the supply chain, while with other supply chain processes there is a growing sense that we are reaching the limits of the natural environment’s ability to sustain its people and their activities.

A widely cited definition of sustainability is incorporated into the 1987 Brundtland Commission definition of sustainable development:

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

This focus on meeting present needs without compromising the future is in essence what the concept of sustainability is about. Adapting this definition slightly provides a useful definition of a sustainable supply chain:

A sustainable supply chain is a supply chain that meets the needs of the present without compromising the ability of future generations to meet their own needs.

This definition recognises the fact that business activities can have detrimental effects on the planet’s natural systems and encourages all actors in the wider supply chain to adopt policies and practices that promote environmental protection.

It can be argued that SCM practitioners have long been at the vanguard in relation to sustainability given SCM’s strong focus on the elimination of waste (or “muda” or “NVAs”) throughout the supply chain. However, the sustainability dimension of SCM needs to be deepened and broadened given the now widely accepted scientific evidence in relation to environmental degradation and its causes. For example, there is a need to more specifically and explicitly acknowledge that sustainability, along with the customer service and financial issues discussed earlier,

is in itself a key objective of SCM. This is analogous to the so-called “triple bottom line” approach focused on people, planet, and profit. Similarly, the “blitzes” on waste that have long been a feature of lean philosophy and the Japanese “Kaizen” concept need to be adopted as a means of ensuring that waste in all its forms is eliminated throughout the supply chain, thus improving environmental sustainability. In short, throughout the supply chain, businesses need to factor in the environmental implications of their decision-making processes

There are clear messages from all of the above in relation specifically to packaging and the packaging supply chain. For many years now, the need for more environmentally-friendly approaches to packaging has been acknowledged, with the phrase *sustainable packaging* now very much part of the industry lexicon. Based on the Brundtland Commission concept, this phrase may usefully be defined as:

Sustainable packaging is packaging that meets the needs of the present without compromising the ability of future generations to meet their own needs.

This is easily said but to put it into practice in a meaningful way requires a mindset shift, as well as the adoption of a range of innovative processes and practices throughout the supply chain. More specifically, the

Sustainable Packaging Coalition defines the concept in terms of packaging being:

- Beneficial, safe and healthy for individuals and communities throughout its product life cycle
- Able to meet market criteria for performance and cost
- Sourced, manufactured, transported and recycled using renewable energy
- Able to maximise the use of renewable and recyclable resources
- Manufactured using clean production technologies and best practices
- Made from materials healthy in all probable end-of-life scenarios
- Physically designed to optimise materials and energy
- Effectively recovered and utilised in biological and/or industrial closed loop cycles.

Interestingly, most of these requirements are supply chain and SCM issues to a greater or lesser extent. For example, “sourced”, “manufactured” and “transported” in point three refer respectively to the so-called “buy”, “make” and “move” links in the supply chain. Point five has implications for the design and management of production links in all packaging supply chains. Points six and seven emphasise new product development (NPD) and design for manufacture (DfM) concepts, both of which are important dimensions in the design and management of packaging sup-

ply chains. Finally, there is both implicit and explicit reference throughout the definition on re-use and re-cycling issues – this has significant implications for the growing area of reverse logistics and the reverse supply chain.

A recent report by Pike Research estimated that sustainable packaging will represent about one third of the total global packaging market by 2014. This trend has significant implications in terms of the design and management of packaging supply chains. Embracing the philosophy of economic sustainability has the potential to be commercially and economically advantageous, thus building on the traditional sustainability-oriented role of SCM in the elimination of waste.

Edward Sweeney is Director of Learning at the NITL.

This article is based on one that appeared in the *Irish Packaging Yearbook and Directory 2010* published earlier this year.



SME Vulnerability in the Supply Chain

By Patrick Daly

Common Business Supply Chain Issues

Many issues are common to businesses of all sizes in the supply chain. For instance, all businesses need to ensure that production and delivery of goods is efficient and environmentally sound. Additionally, all companies should continuously improve product, service and process design and increase their ability to meet evolving customer requirements.

Additionally, all businesses face similar challenges in relation to how they deal with multiple customers and suppliers, how they interact with the legislative and regulatory environment and how they manage the internal dynamics of departmental and individual communications and change.

SME Vulnerability

Nonetheless, Small and Medium Sized Enterprises (SMEs), that is businesses with less than 500 employees, do face a special set of challenges by virtue of the position of relative weakness they occupy within supply chains. This vulnerability comes about either by dint of the fact that SMEs find themselves as suppliers to dominant lead companies such as large retail chains and Original Equipment Manufacturers (OEMs), or by dint of the fact that they are in

competition with such lead companies. Consequently, an issue of premier importance to SMEs is the management of the relationships that they maintain with these customers. These relationships are pivotal to the ability of SMEs to maintain their supplier status.

Diverse Supply Chain Issues to be Faced by SMEs

Although it is true that SMEs do share this supply chain vulnerability, the sector itself is diverse. SMEs provide a wide range of products and services at many different points within supply chains or networks. To maintain their positions SMEs must pay constant attention to their costs, responsiveness, quality and reliability. Let's have a look at a selection of real life supply chain issues being faced by some typical SMEs operations at different points in various consumer products supply chains.

• SME 1: Media Products Retailer on Main Street

1. Ensuring consistency of standards across its own supplier base in terms of advanced shipping notices (ASNs), delivery documentation, barcodes and, packaging.
2. IT systems fragmentation/integration. IPOS data is collected at point of sale but is not integrated to the ware-

house order picking systems

• SME 2: Logistics Service Provider to Consumer Products Manufacturer

1. The SMEs manufacturing customers has become very sophisticated in the application of the concepts and practices of lean production. These customers expect the LSP to apply these tools and techniques in its own business to integrate ever more seamlessly with the requirements of the production plants.
2. The LSP faces a challenge to articulate the value of the services that it provides and develop a pricing model that supports this value proposition. An inability to do this runs the risk of customers appropriating the lion's share of the gains derived from the improvements.

• SME 3: Speciality Food Manufacturer Supplying Multiple Retailers

1. Constant erosion of margins due to high levels of competition in the retail food market and a constant pressure from the large multiple retailers for cost down as consumer spending goes through a period of contraction in the ongoing recession.
2. After a long period of ad hoc growth, the company faces the a challenge to generate

internally innovative change in processes and ways of working to drive cost out and to compensate for the downward pressure on margins.

Supply Chain Opportunities for SMEs

There is an ever increasing tendency for lead organisations such as OEM manufacturers and large multiple retailers to focus on core competencies internally and to develop external networks to provide support activities and functions.

This presents a golden opportunity for those SMEs who are aware of the trend, can identify the opportunities, develop the requisite capabilities and proactively put forward credible value propositions to form part of these support networks.

In some cases, lead companies are prepared to work with, support and even invest in the development of those SMEs that demonstrate a disposition and willingness to upgrade capabilities.

A Proactive Approach Required

However it is not a matter of just responding to the lead company exigency in the short term and hoping to then be left to get on with the business thereafter. Rather SMEs must continuously identify and develop new opportunities and improvements using their own initiative.

Taking this proactive approach to develop independent capabil-

ity will contribute to insulating SMEs to a degree from having the benefits of improvements rapidly appropriated by the lead players. SME owners and managers can present themselves to their lead company customers as people with independent, high value knowledge, skills and capabilities.

Internal Organisational Challenges

SMEs do of course still face a number of organisational factors, some internal and some external, that will constitute serious challenges in this endeavour.

Some of the common intra organisational factors that can make it difficult for the type of company discussed to apply the approaches described above include a tendency among SMEs towards an inward focus and complacency, the old “we have always done things this way” mantra. Further areas of difficulty are a general lack of awareness of business trends

often the result of chronic fire-fighting which tends to tie down and exhaust managers and workers alike leaving little time or energy for professional development and strategic thinking.

Another common trait among SMEs is a fear and insecurity in relation to of formal expertise and technical know how that can feed the self-fulfilling belief that this type of stuff is not practical in the “real” world.

External Organisational Challenges

On the external front some of the organisational challenges that can come into play are the ability to communicate effectively to negotiate, collaborate and challenge lead company managers. Many SMEs are family owned, entrepreneurial businesses in which the owner-managers do not have a great deal of technical training and education. This can put them at a disadvantage when interacting with the highly technically trained managers at many of



the lead companies. Some large retailers and OEMs in response to the business pressures that they themselves are facing have adopted a manner of interacting with supplier SMEs that is often, rightly or wrongly, understood or interpreted as aggressive and exploitative. This sometimes has the effect of producing a resentful compliance on the part of the SME accepting lower margins as the trade-off for retaining the business but often missing the opportunity to engage fully with the lead player to learn, develop and improve.

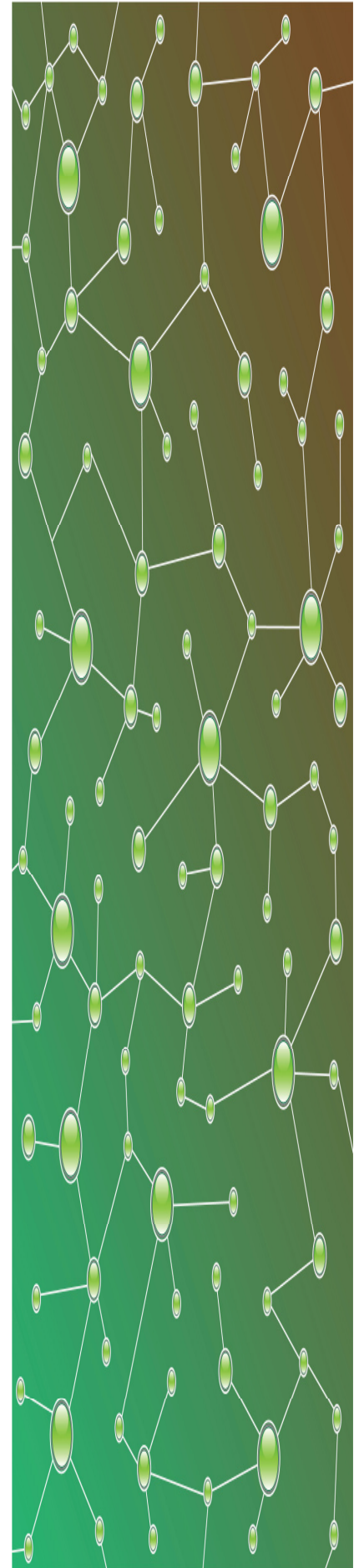
Informal Networks

To overcome these types of limitations requires an opening up of the mind and putting aside the time to take stock of what is happening in the wider business world. SME entrepreneurs can usefully begin their journey to greater awareness through more informal interaction with like-minded individuals from similar business backgrounds that have already made positive progress and who can offer advice and references to appropriate sources of trusted expertise and resource. There are many industry and official forums that can act as the catalyst for these exchanges such as trade organizations, professional institutes, chambers of commerce and business circles as well as the state and regionally funded business support services.

Reaching Out

In the current business environment, anecdotal evidence would seem to indicate that many SMEs are reaching out more and more to look for interaction and guidance. This is a product of the fact that the business downturn has led to people having more time on their hands to think about their business and consider the future. In turn this is leading to a growing realisation that things will be very different in the supply chains of the future. Many SMEs now understand and that new approaches and creative ways of creating value for their customers will have to be found to ensure success and survival.

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Supply Chain Management Postgraduate Programmes, Dublin Institute of Technology

Supply Chain Management (SCM) is one of the greatest opportunities for economic growth and is concerned with the strategic management of the total supply chain from the sourcing of raw materials through to the final consumer. It is particularly important in an Irish context because of the open nature of our economy, the challenges posed by relative geographical peripherality and the potential benefits in terms of cost and customer service.

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