
Editorial

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1 Introduction

Driven by environmental, health and resource imperatives, the emergence of the low carbon vehicles (LCVs) sector has brought about significant changes to transport and travel globally (Calabrese, 2012). In particular, the LCV sector has been necessitated by the global challenge of reducing greenhouse gas emissions and the de-carbonising of transport networks worldwide. Central to this process is an enormous shift away from traditional internal combustion engine (ICE) transport technologies – powered by the consumption of fossil fuels – toward greener vehicles with a smaller carbon footprint (Fujimoto, 2012).

This transition has seen the emergence of the LCV sector as a significant industrial segment within the global automotive industry, offering new market opportunities for established automakers as well as encouraging the emergence of a diverse range of new suppliers and manufacturers seeking to exploit emerging niche markets. In turn, this newly developing sector has required major policy intervention by international, national and regional actors to promote the development of the LCV sector as well as the consumption and diffusion of LCV technologies in passenger and commercial vehicles (Begley and Donnelly, 2011).

However, despite strong regulatory and policy initiatives, the LCV sector remains nascent (Donada and Attias, 2015).

This issue is visible in the European LCV motor industry where plug-in electric vehicles constitute a small portion of the market. The challenge is even more stark in the manufacturing field where European OEMs have largely failed to gain significant market share in emerging transport types (e.g., electric light aircraft, light electric vehicles) and

European component manufactures are often behind market leaders in the field of key technologies (e.g., super-capacitors).

The UK Automotive Council (2013) reiterated this point in its report on the UK automotive supply chain. The report pointed to three major barriers to developing the supply chain:

- an information gap relating to supply and demand for goods and services
- financing issues due to the small size of many firms
- skills required by new products and services within the sector.

One solution offered was to encourage more entrants to the automotive industry through cross-sector engagement, particularly for premium and high-technology product manufacturers within the aerospace, marine and motorsport industries. To underscore this point, the report outlined findings from a supply chain survey. It was found that some firms have as a little as 3% custom with auto manufacturers. The majority of revenue was drawn from other sectors ranging from consumer goods to aerospace.

The diversity of firms within the supply chain was noted by Amison and Bailey (2014) that showed a number of advanced manufacturing and engineering firms with little to no previous history of engagement had developed a significant presence in automotive design and engineering sector over the last decade. This was particularly true among small and niche firms. At EU level, recent studies (JTRC, 2010; INTRASME, 2013) have also identified market uncertainty, supply chain issues and investment bottlenecks as barriers to LCV uptake.

Yet, the use of LCV technology is well-established in other transport modes such as material handling equipment, motorsports, buses, electric light aircraft, air-to-water transport, lane-tracking trams, etc. These innovations can be scaled up in production or may include solutions that can be transferred to other fields. They also represent opportunities for new transport applications and designs. The challenge for stakeholders in the LCV transport supply chain is to identify:

- transferable skills and innovations already present in other transport modes
- the market opportunities represented by emerging technologies
- investment models to capitalise on identified market opportunities.

2 The aim of this special issue

This special issue aims to focus on research comparing and contrasting the role of policy in the regional development of the LCV sector in terms of production and consumption. The papers have been selected after three seminars held by the institutions involved in a research networks partially founded by the Regional Studies Association. From July 2014 to October 2015, in all 15 papers have been presented in Coventry (Coventry University, UK), Piacenza in the Annual RSA conference (CNR-Ircres of Moncalieri, Italy), Kraków (Jagellonian University, Poland).

The aim of this research network is to compare and contrast the development of the LCV sector not only in the three regions in which the participating partner institutions are located – Piedmont, Italy, Małopolska, Poland and the West midlands, UK. By

examining a range of key factors impacting on the sector in the states – including economic concerns, differing regulatory practises, policy drivers and the response from public and private stakeholders – a clearer understanding of how the sector has emerged over recent years will materialise. Creating this network and exchanging information on the LCV sector will in turn allow improved measures to be identified by partner institutions to aid in the development of the sector at regional levels, but will also have important learnings for the national and supranational expansion of the LCV sector also.

As Dicken (2011) notes, technological change is not a deterministic process; its use is conditioned by social and economic factors. The use of a new or emerging technology is typically dependent on business enterprises electing to maximise profit, market share or investment opportunities by developing technological advantage. However, in the instance of LCV technology, the process of change is being driven primarily by policy at regional, national and supranational levels. Initiatives, such as the Kyoto Protocol (February 2005), the Paris Climate Conference (COP21 2015), and EU carbon emission regulations (e.g., EC No. 443/2009 and EU No. 510/2011) have established the policy framework for automotive producers, forcing them to provide a range of different vehicles to meet targets set by environmental regulations. At regional and national level, policymakers are interpreting these regulatory structures and creating the environment in which the automakers must operate. This has included national initiatives to promote the use of LCVs, for example, vehicle subsidies and the widespread roll-out of charging posts for LCVs utilising electric engines. At a regional level, the decision by policy makers to introduce the use of congestion charges (in the Greater London area for example) and the creation low emission zones (limiting high-emitting vehicles in certain areas such as has occurred in Turin, Italy) has also served to create pressure from below on producers. The response by the European automotive industry to these pressures from above and below has been to focus on three major LCV technologies; hydrogen vehicles, electric vehicles and hybrids. However, this production process has not been uniformly pursued across regions and states, nor has the promotion and take-up of these vehicles been homogeneous by stakeholders and consumers, respectively.

Although the concept of national automotive producing brands can no longer be considered accurate due to the transnational nature of the automotive sector, European producers remain very much Eurocentric in their production processes, as well as being products of their histories and guided by their particular geographies. Because the acquisition and communication of tacit knowledge are strongly localised geographically, there is a tendency for localised ‘knowledge pools’ to develop around specific activities. Firms are induced to innovate by conditions that are found in the market for products, as well as by the behaviours of consumers and competitors (Antonelli and David, 2006). Different actors located in different regions, challenged by different circumstances and resources to draw on, may react to prevailing economic and regulatory conditions in very different ways, with quite different regional outcomes. Therefore, communication, technological spillovers, interactions and learnings across firms are essential to the technological dissemination process.

Playing a central role in this process are systems of innovation. As Miozzo (2006) notes, different elements of these systems are interrelated and interdependencies are important in terms of specialisation and production. Sources of innovation in such systems include; business firms, educational institutions, public sector research institutions, public policy making units, financial institutions, legal institutions, trade

unions and political organisations. These networks of public and private institutions modify and diffuse new technologies through their actions and interactions (Freeman, 1987). Importantly, Freeman argues that a nation or a region with limited resources may experience rapid catch-up or progress through imported technology and local adaptation and development. Conversely, poor decision making/organisation may see resources being wasted and ineffective methods adopted. The import of this argument is that by developing networks of communication and sharing information, observation and analysis of emerging trends in a particular sector – in this instance the LCV sector – can inform decision making and speed up the process of technological diffusion by adopting better processes and innovations.

3 The contents of this special issue

Most of the papers presented at the three seminars are related to the three countries from which the partner institutions are drawn, all three have had very differing developmental pathways associated with the motor industry in general and the LCV sector in particular, determined very much by their historical and geographical background.

Nevertheless, the criteria adopted for the selection of the papers avoided local emphasis and tried to enlarge the ‘frontiers’ with regard the countries taken into account – that is not only the UK, Italy and Poland but also France, Germany, Sweden, Spain, California and China – and the type of automotive vehicle that is not only passenger cars but also the less investigated heavy commercial vehicles (trucks, coaches and busses).

The structure of the first four papers is similar: firstly empirical evidence, secondly policy discussion and consequences. Moreover, in the last paper, the empirical evidence is based on a comparison of five different national policies in supporting electric vehicles.

In the paper ‘An ethical assessment of low carbon vehicles using cost-benefit analysis’, Nikolas Thomopoulos and Gillian Harrison point out that global concerns about climate change, as confirmed at COP21, have led to lower carbon emissions environmental policies, particularly in the road transport sector. Through an empirical analysis of LCV policies in California, their paper contrasts the findings from diverse distribution theories between income quintiles – used as a proxy for social groups – to address vertical equity concerns and offer an overview of impact distribution to policy makers. Thus, the paper contributes in operationalising ethical theories within transport cost-benefit analysis and revisiting impact distribution when promoting LCVs. Their findings indicate that manufacturer penalties are the most effective policy measure to avoid cost transfer between stakeholders. Yet, the analysis shows that those purchasing small LCVs may face disproportional vehicle purchase cost increases which needs to be considered by policy makers. Thus, this paper makes a methodological contribution regarding cost-benefit analysis in practice as well as providing policy relevant recommendations.

In the paper ‘The electric vehicle landscape in China: between institutional and market forces’, Bo Chen and Christophe Midler pay attention on the electric vehicle market in China that faces many challenges besides strong governmental support. Nevertheless, academic literature and official reports lack model-based sales data of passenger plug-in electric vehicles, a prerequisite to understanding dynamics between regulation, industry and market. Besides, a vast but informal low speed electric vehicle private market is fast growing in China’s lower tier cities. Their paper provides the public

debate and the literature with a comprehensive yearly sales dataset by models of the Chinese passenger plug-in electric vehicle market from 2009 to the first quarter of 2015. Moreover, the authors build a typology of the market by analysing product characteristics, usages and deployment territories and synthesise results in a unique landscape. Finally, they formulate industry and regulatory implications for the different electric mobility levers in China.

In the paper ‘Niche experiments with alternative powertrain technologies: the case of electric city-buses in Europe’, Benny Borghei and Thomas Magnusson report that powertrain technologies based on ICEs dominate the city bus market and related selection criteria for performance and reliability rule vehicle purchasing decisions. Alternative powertrain technologies still struggle for legitimacy and price-performance criteria acceptance. Their paper provides insights from experimentations related to environmentally enhanced and alternative powertrain technologies for heavy commercial vehicles, in particular, hybrid and electric city buses in Europe. It points at a need for increased interactions amid local experiments as well as sharing of learning experience from different fieldworks across cities, regions and nations. Such ‘networked experiments’ ought to facilitate translation, negotiation and transfer of local lessons into generic rules that are applicable at higher aggregation orders. Highlighting the challenges of linking local niche experiments, this paper contributes to further development of theoretical concepts within literature on strategic niche management.

In the paper ‘European semi-periphery under environmental pressure: the case of urban public bus transportation and private bus-makers in Poland’, Bolesław Domański, Robert Guzik, Krzysztof Gwosdz, Arkadiusz Kołoś and Jakub Taczanowski explore the factors shaping the adoption of low-emission vehicles in urban public transportation in Poland. The country has leapfrogged to a position among European leaders in the manufacturing of hybrid and electric buses within twenty years due to foreign investors (Volvo) and domestic enterprises (Solaris). At the same time, the adoption of new powertrain technologies in urban public transportation has lagged behind Western Europe. Contrary to the hypothesis there is no hierarchical diffusion of hybrid and electric vehicles from major cities to medium-sized and smaller towns in Poland. EU regulations provide a general legal framework for environmentally-friendly public transportation; however, they do not determine the adoption rates of particular low-emissions technologies. The actual pattern of use of hybrid and electric vehicles in urban public transportation in Poland seems to depend on local factors in the main, including institutional arrangements, social and personal characteristics.

Finally, in the paper ‘National policy-making and the promotion of electric vehicles’, the authors consider supply-side factors underpinning technology forcing by national policymakers in the LCV sector. It focuses on five countries – France, Germany, Italy, Spain and the UK – and examines the driving imperatives for promoting alternative fuel vehicle and electric vehicle uptake. It does so by looking at four overarching concerns for decision-makers; energy security, sustainable development, impact on the existing automotive sector and the pressure from sub-national actors. The paper seeks to show that national policy in the five selected countries is heterogeneous in nature making consistent, standardised approaches to policy implementation a challenge, despite the similarity in ambition to advance instances of electromobility and to transition from conventional transport technology to alternative fuel vehicles.

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