The case for transformational change in the automotive distribution industry

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ABSTRACT

The automotive manufacturing industry has historically been at the forefront of initiatives that have sought to increase efficiency. The focus of Lean Production has been on the upstream manufacturing with limited consideration of downstream service activities.

This paper develops a supply chain model of the UK automotive industry that explains the structure and how automotive assemblers control the industry. It finds automotive distribution is the largest subsector in terms of the number of companies, operating revenue, number of employees, profit, cash flow and total assets.

The approaches for managing relationships and disseminating best practices within the supply chain are considered. Using existing proxy measures of ‘Leaness’, the scope for improving the performance of service-based motor distributors is demonstrated.

Keywords: continuous improvement, lean production, performance measurement, service industries, supply chain management.

INTRODUCTION

The automotive industry comprises component supply, assembly and distribution. In the UK, the automotive industry makes a major contribution to the economy. The component supply and assembly processes are manufacturing operations, whereas distribution operates on a service model. The automotive manufacturing industry has historically been at the forefront of initiatives that have sought to increase efficiency. The industry has a concentrated structure, with a automotive assemblers exerting an extraordinary amount of power over smaller firms. The main markets are dominated by eleven companies from Japan, Germany and the USA (Sturgeon, Memedovic, Van Biesebroeck, & Gereffi, 2009). The purchasing power of the automotive assemblers, positioned in the middle of the supply chain enables them
to force suppliers to accommodate their idiosyncratic requirements (Sturgeon, Van Biesebroeck, & Gereffi, 2008). Likewise, franchise contracts with dealers substantially constrain franchisees’ decision-making rights and provide the manufacturers with significant enforcement powers including monitoring, termination and monetary incentives (Arruñada, Garicano, & Vázquez, 2001).

The major manufacturers have adopted build-to-order and mass customisation strategies to enable them to increase product variety to meet customers’ requirements for more individualised vehicles (Laurent Lim, Alpan, & Penz, 2014).

Lean production, based upon the Toyota Production System provides an approach to increase the efficiency and effectiveness of operations through the eliminating waste and minimising inventory (Womack & Jones, 1996). Lean has been widely disseminated to other manufacturing and service sectors. In the automotive industry, the focus has been on the upstream part of the supply chain (component suppliers and automotive assembly) with relatively little consideration, by academics or practitioners, of the downstream service activities (automotive distribution, sales and servicing).

The paper addresses the following research questions:

1) What is the structure of the automotive supply chain and how can it be modelled?
2) What is the relative significance of the subsectors to the UK economy and what is the relative performance?
3) How Lean are the different parts of the supply chain?

The paper first investigates the literature on product delivery strategies, Lean in the automotive industry and then considers supplier development and franchising agreements that are used for managing relationships with suppliers and distributors. This is followed by a systematic analysis of the industry using financial data, which addresses questions (2) and (3) above.

LITERATURE REVIEW

The order penetration point (OPP), alternatively known as the customer order decoupling point, is the stage in the value chain when an order is linked to a specific customer. Operations before the OPP are forecast driven, whereas those after the OPP are customer-order driven. It is desirable to reduce the
number of activities that are forecast driven in order to reduce inventories (Olhager, 2003). It is common for strategic stock to be held as a buffer between fluctuating customer orders/product variety and smooth production output. The Lean paradigm can be applied to operations upstream of the decoupling point whereas the agile paradigm can be applied downstream (Naylor, Naim, & Berry, 1999). Both paradigms require lead times to be minimised and effective sharing of information through the supply chain (Mason-Jones, Naylor, & Towill, 2000). The build-to-order (BTO) strategy preferred by motor manufacturers make all operations customer-driven, which makes it necessary to have a supply chain that is responsive and flexible, particularly with respect to volume and product mix. This strategy avoids many of the costs associated with make-to-stock production, which include the cost of incentives needed to sell overproduced models and discounts required to persuade customers to accept compromises on their preferred specification (Holweg, Disney, Hines, & Naim, 2005).

There is a voluminous literature on Lean which originated in automotive manufacturing (for an overview see (Holweg, 2007). The overall objective of Lean is to maximise value, minimise waste and achieve continuous improvement (Womack & Jones, 1996). There are many Lean tools and techniques that have been applied to improve processes within companies and these have received much attention in the literature (Bicheno, 2004). Increasingly attention is being paid to the integration of supply chains (Cagliano, Caniato, & Spina, 2006).

Supplier development is any activity performed by a buyer to increase the performance and capabilities of its suppliers (Ellram & Krause, 1997). Automotive manufacturers have engaged in supplier development initiatives in order to improve the performance of upstream manufacturing activities. Sako (2004) noted that supplier development was a mechanism to disseminate internal capabilities across boundaries and had been normal practice in the Japanese automotive industry for several decades. For example, automotive manufacturers may send engineers to assist suppliers through the provision of training in continuous improvement.

In recent years there has been growing emphasis on the application of Lean in the service sector (Suárez-Barraza, Smith, & Dahlgaard-Park, 2012). Despite the continuous evolution of Lean, limited attention has
been paid to downstream service operations in the automotive industry (Reichhart & Holweg, 2007). Kiff (2000, p.117) investigated Lean distribution in the automotive supply chain focusing on Lean dealerships and commented that significant stock and waste were caused by the systems and procedures that linked dealerships with the automotive manufacturers’ national sales companies. Kiff postulated that the better management of sales and servicing would increase customer satisfaction and reduce waste.

The automotive manufacturers’ national sales companies manage the sale of cars through franchising agreements with dealers (Davey-Rafer, 1998). Franchisors entrust their trademarks and brand to independent franchisees and govern their relationship through contractual terms, monitoring and extra contractual incentives (Kashyap, Antia, & Frazier, 2012). Franchise contracts include mechanisms for monitoring performance and penalties for under performance. The balance of power is heavily weighted in favour of the franchisor (Davey-Rafer, 1998; Kessler, 1957). Lusch (1976) identified ways in which automotive manufacturers supported their franchisees: national/local advertising, executive/salesman/mechanic training, salesman/dealer incentive programs, service/sales representatives, tools and equipment, warranties, service manuals and floor plan assistance. Lusch also identified a number of coercive strategies that included the slow delivery of vehicles, slow payment on warranty work, unfair distribution of vehicles, declining warranty work, threat of termination and red tape. Lusch found evidence that manufacturers primarily relied on coercive sources of power. Whilst the literature suggests that the suppliers of automotive components receive support in continuous improvement through manufacturer supplier development activities (Sako, 2004), there appears to be no evidence of the corresponding development of automotive distributors.

**METHODOLOGY**

The research was based upon a quantitative analysis of financial data that was obtained from the Amedeus database (https://amadeus.bvdinfo.com), which is categorised according to standard industrial classification (SIC). SIC codes were developed by the Office of National Statistics for the collection, tabulation, presentation and analysis of data. The classification is hierarchical and uniformly categorises
business establishments according to the type of economic activity. The sectors of the economy related to the automotive industry are: SIC 45 “wholesale and retail trade and repair of motor vehicles and motorcycles” and SIC 29 “manufacture of motor vehicles, trailers and semi-trailers”. This paper is based upon the following sub-categories: SIC 29.31 “manufacture of electrical and electronic equipment for motor vehicles”; SIC 29.32 “manufacture of other parts and accessories for motor vehicles”; SIC 29.11 “manufacture of motor vehicles”; SIC 45.11 “sale of cars and light motor vehicles”; SIC 45.2 “maintenance and repair of motor vehicles”; and SIC 45.3 “sale of motor vehicle parts and accessories”.

Amedeus provides normalised accounting information on European companies with operating revenues over €15m, or with more than 150 employees, or total assets greater than €30m from 2004 onwards. The output generated can be configured to suit user requirements. The search strategy used was to download standardised reports for 2012 for all active companies in the UK, filtered by sector (i.e. 29.11, 29.31, 29.32, 45.11, 45.2, 45.3). The output comprised 51 variables, including: size and group information; key financial data, including balance sheet and income statement data; and ratios (profitability, operational, structure and per employee). The first stage of the analysis was to gain an understanding of the overall structure of the automotive supply chain and the contribution of the various subsectors. The contribution of the various subsectors were analysed using the following aggregated data: the number of companies; operating revenue, number of employees, profit and loss before tax, cash flows and total assets.

**Measures of performance**

A number of researchers have studied the effect of Lean Production on financial performance (Eroglu & Hofer, 2011). The output variables obtained for each company included a wide range of performance indicators. The performance of companies was evaluated in terms of: return on capital employed, profit margin, and stock turn ratio. John Krafcik (1988) coined the term ‘Lean’ to describe low inventory systems that he contrasted with modern Fordist ‘buffer’ systems, which retained considerable inventory to mitigate the impact of various uncertainties. The objective of many Lean tools is to minimise waste and inventory, therefore inventory measures are considered to be a good indicator of improved organisational
performance (Cannon, 2008). Many researchers have used the stock turn ratio as a metric (Demeter, 2003; Swamidass, 2007; Vastag & Whybark, 2005). Other researchers have considered a variety of measures including the return on investment and profitability (Hofer, Eroglu, & Rossiter Hofer, 2012).

**INDUSTRY ANALYSIS**

Table 1 and Table 2 show the aggregated data for selected subsectors of the automotive industry. In total, there were 1,782 companies, with 495,793 employees. The figures for operating revenue include considerable double counting within the supply chain for new vehicles. It also includes the resale of second hand vehicles. Automotive distribution is the largest subsector in terms of the number of companies, operating revenue, number of employees, profit, cash flow and total assets.

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Table 3 shows the mean performance of companies in the sectors in terms of stock turnover, profit margin and return on capital employed. It is notable that there are large variations in the stock turn ratios. The automotive manufacturers (SIC 29.11) achieved an average of 23.13, which is equivalent to approximately two weeks stock. The maintenance and repair sector (SIC 45.2) had the lowest value of 8.55 (6 weeks). The values for the component suppliers were 8.67 for SIC 29.31 and 18.1 for SIC29.32. However, SIC 29.31 was a relatively small part of the automotive industry. The automotive distributors and spare parts suppliers both had a stock turn ratio under 12. Thus, if the stock turnover is considered as a proxy for ‘Leaniness’ this analysis suggests that the service components of the supply chain (SIC 45.11, 45.2 and 45.3) lag behind the manufacturing sectors. This suggests that implementing Lean in these subsectors could significantly improve the performance of the overall supply chain.

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Figure 1 shows a model of the automotive supply chain that illustrates its structure and major characteristics. The first component shows the relationships between the various subsectors. The second shows that the upstream subsectors are engaged in manufacturing activities, whereas the downstream subsectors are service companies. The model then shows that the supply chain is controlled and coordinated by the automotive manufacturers that utilise supply contracts and supplier development to control upstream suppliers and franchising contracts to control downstream distributors. The following ‘swim lanes’ show there are relatively few automotive assembly companies (SIC29.11) and that there is significant industry concentration. Automotive distribution is far larger in terms of the number of companies, employees and assets employed. The final element of the model shows the variations in stock turn ratio for the different parts of the supply chain.

**DISCUSSION AND CONCLUSIONS**

The overall automotive supply chain comprises manufacturing and service components. A ‘swim lane’ model was developed that shows the industry structure, showing the subsectors engaged in manufacturing and service activities. In the UK, automotive distribution is the largest component of the supply chain in terms of employment, capital employed and operating revenue. The automotive assembly subsector is highly concentrated and exerts considerable power over its suppliers and distributors. Suppliers are managed through contracts and supplier development activities. Motor distributors are managed through franchise contracts that allocate rights over substantial decisions and include monitoring reward and punishment mechanisms.

The automotive industry is widely considered to be an exemplar of continuous improvement and Lean Production. However, the analysis of industry data reveals that only the manufacturing part of the supply chain achieved high levels of stock turnover (a commonly used indicator of ‘Leaness’). The literature reveals that the automotive manufacturers provide extensive support to suppliers through supplier development initiatives that focus on improving operational performance through continuous
The research has identified that the automotive manufacturers have different strategies for managing upstream manufacturing and downstream distribution. The automotive manufacturing companies have established partnership arrangements with first-tier suppliers that have been underpinned by extensive supplier development initiatives. The automotive manufacturers have established national sales companies that operate franchise agreements with the dealerships. Although these agreements provide training and support, the focus is on brand management, customer service, and technical skills. The national sales organisations decouple distributors from automotive manufacturing; the automotive manufacturers do not provide distributors with assistance with to improve their operational performance through Lean. The continuous improvement of operations and processes remains the responsibility of the franchisee.

**FURTHER WORK**

The research has identified significant gaps in the literature associated with automotive distribution. On the basis of this analysis the Research Team has worked closely with a major dealership with multiple franchises to explore these issues further\(^1\). The work will include the development of an integrated transformation change initiative that will incorporate strategy, human resource management and Lean philosophy and methods. A preliminary analysis of the organisation has identified the following challenges: low margins, increased competition, changing customer expectations, an increased emphasis on customer satisfaction by manufacturers, the need to implement best practices across multiple brands and market segments. The work will develop support mechanisms that will help the Company achieve continuous improvement in its operations and processes. This will overcome the lack of support provided through the automotive manufacturers.

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\(^1\) A Knowledge Transfer Partnership funded by the Technology Strategy Board.
REFERENCES


<table>
<thead>
<tr>
<th>Sector</th>
<th>Number of companies</th>
<th>Operating Revenue (£k)</th>
<th>No. Employees</th>
<th>P/L before tax (£k)</th>
<th>Cash flow (£k)</th>
<th>Total assets (£k)</th>
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<tr>
<td>29.31</td>
<td>13</td>
<td>875,481</td>
<td>18,838</td>
<td>-5,655</td>
<td>13,309</td>
<td>707,327</td>
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<td>29.32</td>
<td>124</td>
<td>14,772,074</td>
<td>83,367</td>
<td>856,986</td>
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<td>29.11</td>
<td>48</td>
<td>44,116,992</td>
<td>67,633</td>
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<td>45.11</td>
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<td>10,092,092</td>
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<td>45.3</td>
<td>255</td>
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<td>64,340</td>
<td>365,468</td>
<td>433,186</td>
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<td>TOTAL</td>
<td>1782</td>
<td>199,291,635</td>
<td>495,793</td>
<td>3,344,356</td>
<td>5,643,396</td>
<td>97,598,684</td>
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Table 1: Summary of UK Automotive Supply Chain in 2012
### SECTOR TOTALS

<table>
<thead>
<tr>
<th>Sector</th>
<th>Number of companies (%)</th>
<th>Operating Revenue (%)</th>
<th>No. Employees (%)</th>
<th>P/L before tax (%)</th>
<th>Cash flow (%)</th>
<th>Total assets (£k)</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.31</td>
<td>0.73%</td>
<td>0.44%</td>
<td>3.80%</td>
<td>-0.17%</td>
<td>0.24%</td>
<td>0.72%</td>
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<td>29.32</td>
<td>6.96%</td>
<td>7.41%</td>
<td>16.81%</td>
<td>25.62%</td>
<td>21.95%</td>
<td>13.00%</td>
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<tr>
<td>29.11</td>
<td>2.69%</td>
<td>22.14%</td>
<td>13.64%</td>
<td>17.26%</td>
<td>32.16%</td>
<td>28.47%</td>
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<tr>
<td>45.11</td>
<td>54.43%</td>
<td>57.75%</td>
<td>42.28%</td>
<td>40.88%</td>
<td>32.28%</td>
<td>45.46%</td>
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<tr>
<td>45.2</td>
<td>10.44%</td>
<td>5.06%</td>
<td>10.49%</td>
<td>5.47%</td>
<td>5.70%</td>
<td>4.89%</td>
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<tr>
<td>45.3</td>
<td>14.31%</td>
<td>7.20%</td>
<td>12.98%</td>
<td>10.93%</td>
<td>7.68%</td>
<td>7.46%</td>
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<tr>
<td>TOTAL</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
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Table 2: Percentage contribution of subsectors (2012)

<table>
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<tr>
<th>Sector</th>
<th>Stock turnover</th>
<th>Profit margin (%)</th>
<th>ROCE using P/L before tax (%)</th>
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<tr>
<td>29.31</td>
<td>8.67</td>
<td>2.49</td>
<td>5.73</td>
</tr>
<tr>
<td>29.32</td>
<td>18.10</td>
<td>2.55</td>
<td>17.40</td>
</tr>
<tr>
<td>29.11</td>
<td>23.13</td>
<td>-2.59</td>
<td>2.99</td>
</tr>
<tr>
<td>45.11</td>
<td>11.80</td>
<td>1.25</td>
<td>13.02</td>
</tr>
<tr>
<td>45.2</td>
<td>8.55</td>
<td>2.21</td>
<td>9.30</td>
</tr>
<tr>
<td>45.3</td>
<td>11.95</td>
<td>3.49</td>
<td>24.34</td>
</tr>
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</table>

Table 3: Mean performance of automotive subsectors in 2012
Figure 1 A model of the UK automotive industry