**THE ROLE OF APPLIED THEORY TO DELIVER SAFETY, COMPLIANCE, AIR QUALITY AND COMPETITIVE BENEFITS TO THE UK ROAD FREIGHT TRANSPORT SECTOR**

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# INTRODUCTION

Operator recognition and compliance schemes are not a new phenomenon, with many such schemes being established during the last decade; each existing scheme is organised slightly differently, principle drivers behind their creation has usually been one or a combination of the following objectives: to address political targets around air quality and sustainability; to improve the operational efficiency and performance of commercial vehicle fleets; to improve road safety and, to adhere to industry best practice standards. The focus of this paper is on two established schemes in the UK.

As economies have evolved and supply chains advanced on a global scale our reliance on road transportation has increased. These demands on the freight transport sector in particular can lead to various degrees of operational inefficiencies that operator recognition schemes seek to improve. However, the benefits of scheme membership are potentially far more reaching than simply short term operational improvements, as inherent in their design, is the possibility to act as interventions to help policymakers achieve longer term impacts around sustainability and air quality targets. In the UK context there exist a number of membership accreditation schemes targeted at vehicle fleet operators including: ECOSTARS; Fleet Operator Recognition Scheme (FORS); Van and Truck Excellence schemes. Whilst these schemes initially developed as being purely for the freight sector, the larger schemes (ECOSTARS and FORS) have since widened their participation to be more inclusive of fleet operators more generally, such as the bus and coach sectors, and licensed taxi firms. Interest in such schemes and their potential benefits is not wholly confined to the UK; there are ECOSTARS schemes operating in various European locations. The EU’s Transport Commission’s role is to promote mobility that is efficient, safe, secure and environmentally friendly (EU Transport Commission, 2011). ECOSTARS and FORS have their genesis in initiatives such as the Operator Compliance Risk Scores programme (DVSA, 2006), the Sustainable Urban Movement Plan, the Sustainable Urban Goods Logistics Achieved by Regional & Local polices (SUGAR) (Interreg, 2013), as well as the Reward and Recognition Scheme (RECODRIVE) and the Auditing & Certification Scheme (ADVANCE).

Air quality and sustainability are key drivers behind the establishment of industry recognition and compliance schemes, with road freight transport being directly responsible for Particulate Matter (PM), nitrogen dioxide (NO2), and carbon dioxide (CO2) emissions leading to poor air quality, especially in urban environments (Dablanc, 2008). With the development of concerns over urban sustainability and air quality, particularly in Western Europe, freight transport has faced increasing criticism. The introduction of some EU legislation (e.g. EU Council Directive 96/62) have imposed specific responsibilities on transport policy makers to implement the necessary measures to ensure compliance with EU limits (Dablanc, 2008). Such legislation has prompted the establishment of Low Emission Zones (LEZs) in major cities and urban conurbations to restrict the most polluting vehicles (freight vehicles are the primary target for LEZ policies) by setting standards according to vehicle age and type (Cruz and Montenon, 2016). The UK government has recently set the goal of achieving >40μg/m3 annual mean NO2 in its 43 UK air quality reporting zones by 2021, to address findings from 2015, which revealed that 37 of the 43 pre-established air quality management zones still exceeded the upper thresholds measure of 40μg/m3 annual mean NO2 limit (DEFRA, 2017).

# LITERATURE REVIEW

We posit that antecedent service operations management theory forms the basis of operator recognition schemes, but this has been implicit rather than explicit, thereby stifling the development of the concept of Transport Total Quality Management, further evidenced by our own search of extant literature across several academic databases. TQM research in a transport context remains both under-developed and elusive, limited to TQM application in public transport systems (Andrle, 1994; Tam and Hui, 1996), service level agreements (Parish, 1997) and transport sector employee job satisfaction (Morrow et al., 2011). Grant (2012) records a possible reason for this situation in that a ‘non-unionist’ perspective prevails in the freight transport sector as operators being ‘for hire’ either within an organisation or as an external supplier. Another aspect working against historical adoption of TQM is relative scale; an important factor given the profile of the freight industry in which the majority of operators are classed as Micro, Small or Medium sized enterprises (MSMEs). These MSME’s are structurally different from large organisations; they are disadvantaged through restricted horizontal and vertical integration in the ability to ‘scale down’ quality management systems (Ahire and Golhar, 1996; McAdam, 2000). The wider concept of quality management is centred upon the proactive management and control of dynamic multiple variables (Sousa and Voss, 2002), this suggests that Transport TQM can be a business process improvement framework, offering much potential value to the freight and transport sector where continuous improvement cycles can offer more comprehensive quality management regulation through driving innovation rather than imitation.

Ebrahimi and Sadeghi’s (2013) argue that TQM represents an integrated management philosophy, whereby quality is mandatory in meeting customer expectations through retaining customer focus (Sousa and Voss, 2002; Kaynak, 2003; Asif et al., 2013; Coimbra, 2013; Oakland, 2014). Meanwhile, Kumar *et al*. (2009) record that the multidimensional aspects of TQM indicating its ability to be ‘cherry picked’ for application by small businesses, also previously identified in the research of Parish (1997). This concept of a customised performance management approach is further developed by Ates *et al* (2013) as an iterative closed-loop process. Therefore, TQM can be viewed from differing perspectives in relation to corporate culture (Dahlgaard, et al., 1998), cycles of continuous improvement (Hellsten and Klefsjo, 2000), and as an overarching paradigm (Besterfield et al., 2008), to ultimately improve continuously to satisfy customer demands (Deepika, et al., 2016). This culture of continuous improvement in relation to the value of customers requires a rolling programme of development for colleagues (Al-Bourini, et al., 2013), indicating that service quality satisfies demands and expectations for both internal and external customers. The transport sector as a service provider has definable service measures related to time, destination, quality of shipment upon receipt and driver / vehicle performance regarded as a totality of features by Islam and Zunder (2014). TQM remains a paradigm of objective intentions to improve customer service (Karuppusami and Gandhinathan, 2006), contemporaneously delivering competitive advantage (Reed et al., 2000), reinforcing our proposition that a Transport TQM framework can offer significant benefit to the sector.

# An overview of the two identified Operator Schemes

The Freight Operator Recognition Scheme (FORS) was initially established in 2008 by Transport for London (TfL) in response to the introduction of London’s Urban Low Emission Zone. The original FORS scheme under TfL was a free, voluntary accreditation membership scheme that aimed to improve the delivery of freight across central London, where it formed part of the wider London Freight Plan, providing the freight industry with a quality and performance benchmark (TFL, 2010). The TfL funding and subsidy for the FORS scheme came to an end in 2014/15, at which point it was transferred out of TfL to become the commercially operated Fleet Operator Recognition Scheme (still known as FORS). Although no longer a free scheme, it remains voluntary and the benefits of FORS have been made more available to a wider population of fleet and freight operators following its re-launch on a national scale across the UK, and extension of the scheme to include coach and van operators. The FORS scheme still aims to assist vehicle fleet operators improve all aspects of their operations, including inter alia, road safety, fuel efficiency, reduce emissions, and cut costs. Fleet operators can apply for FORS accreditation on three levels – Bronze, Silver and Gold, following a formal company audit of the operator’s premises by an independent FORS auditor.

The ECOSTARS scheme was established in 2009, set up by four local authorities in South Yorkshire (Barnsley, Doncaster, Sheffield, and Rotherham) as part of a regional Air Quality Initiative to promote best practice in fleet operations and improved engagement between local/regional governments and commercial fleet operators (Fioretto, 2014). Unlike FORS, the ECO Stars scheme continues to remain free for operators to join and aims to help them improve efficiency, reduce fuel consumption and emissions, and achieve cost savings (ECOSTARS, 2016). Like FORS, ECOSTARS has also expanded in the UK beyond the South Yorkshire region, and has been adopted by numerous local authorities across the UK including extensively take-up throughout Scotland, and migrating to some European cities as a mechanism to help address their air quality issues. The scheme is open to fleet operators of HGVs, buses, coaches, vans or taxis either based or operating in an area with a local ECOSTARS scheme. The ECOSTARS accreditation process involves an initial assessment against six key pillars of fleet operational efficiency. Depending on each assessed operators current operational and environmental performance, a star rating (ranging from 1 star to 5 stars) is awarded.

We acknowledge that there are other recognition schemes in the UK such as the Freight Transport Association’s ‘Truck Excellence’ and ‘Van Excellence’. The Truck Excellence certification scheme audits an operator's compliance with their Operator licence undertakings. Similarly, Van Excellence is designed to allow operators to ensure their standards of operation meet the best practice requirements determined in the Van Excellence Code, which we believe represents a local derivation of the previously identified Sustainable Urban Goods Logistics Achieved by Regional & Local polices. The FTA schemes can also arguably demonstrate the development of a scheme by a professional body that has adopted what the industry deemed to be the ‘prime cuts’ of the previously mentioned EU initiatives and the original TfL FORS scheme prior to its nationwide adaptation.

# RESEARCH APPROACH

We conducted a comparative analysis of two major recognition schemes in the UK. The research approach has incorporated an industry survey and qualitative interviews which has led to the ongoing development of a multi-criteria decision analysis tool. Purposive sampling was utilised from the outset (Easterby-Smith *et al*., 2015), commencing with an examination of scheme membership across a fixed period of time. Both operational and strategic roles were identified for participation in the research; they are of equal and critical importance, especially in relation to emerging phenomena, and the role of tacit knowledge in scheme adoption in relation to scale. The findings presented in this paper are drawn from current, lapsed and aspiring scheme members, scheme administrators, local authority policy makers and other stakeholders. This selection of current, lapsed and aspiring scheme members was driven by the need to comprehend ‘same but different’ operations in the freight sectors, whereby a comparative analysis allowed comprehension of to what extent advantage, if any, is gained in scheme membership. Initial data collection occurred via an autonomous self-administered questionnaire which was sent electronically to both current and past recognition scheme members, as well as to a wider population of freight transport operators (some of which were not a member of any scheme). To a certain extent the survey represents a repeat experiment of the Transport for London Report: Attitudes to TfL’s Freight Operator Recognition Scheme, however the original questions posed were de-constructed and reposed to give greater contextual and contemporary relevance to the respondents, to capture both views on historical and future attitudes (Piecyk and McKinnon, 2010). Further questions were also added with respect to exploring the role of such schemes in facilitating Transport TQM; operator views on the perceived benefits and disadvantages of freight fleet operator schemes; and questions to help determine potential areas for scheme improvements and recommendations for increasing uptake.

The semi-structured interviews were based on *a priori* themes extracted from academic and grey literatures and was used to supplement the quantitative survey data, to allow recording of particular occurrences, phenomena and underlying constructs (Jonsen and Jehn, 2009) in relation to the different schemes. The semi-structured interview approach, is an essential source of information gathering for rich, textual data in case studies (Yin, 2014; Silverman, 2004), in conjunction with an interview guide informed by our literature research, it enabled our research to explore relevant topics whilst not conforming to a rigid set of questions (Easterby-Smith, et al., 2015).

Given our analysis, we reasonably presuppose that compliance schemes are more valuable tools as a locus across sustainability agendas and delivered in partnership for wider stakeholder good; to proffer for, rather than profit from. This further positions the importance and potential benefits of Transport Total Quality Management, based upon the preponderance of our evidence as a theoretical position requiring further research. TTQM involves the commoditisation of both autonomously generated data and implicit organisational skills to the overall benefit of customers, be they private or as regulatory bodies. TTQM is not negatively influenced by scale, but improved upon by skill recognition and data optimization. Additionally, our research findings reveal that a 'one size fits all's policy’ of one scheme works against innovation and continuous improvement. Industry interests are not practically addressed at both extremes of scale, here, a homogeneous approach does little more than deliver imitation rather than the innovative approaches required to improve customer satisfaction. TTQM becomes more valuable in relation to scale, when framed within structured continuous improvements, responding to internal and external customer feedback in a quality management system. Our research therefore suggests that TTQM as a construct and theory development, depends upon all colleagues in a transport operational agency, whether publicly or privately owned, to advance incrementally and sustainably, with due consideration of all stakeholders via a series of measurements and initiatives.

# CONCLUSIONS

There is competition for members across these two schemes. Although there is no limit of number of schemes an operator can join, there is often an economic limit set by organisations regarding affordability of membership of multiple schemes and potential conflicting levels of accreditation etc.

The different EU schemes aforementioned have been fixed term, time defined and financially determined projects. However, these incremental steps forward in the evolution of transport, under the auspices and sponsorship of the European Commission can arguably be positioned within TQM itself based upon a cumulative set of improvement measures. Nevertheless, the level of disconnection between each scheme given the various lead project institutions has worked against the emergence of a Transport TQM approach to longer-term success. This research goes some way in addressing these shortfalls by revealing both the barriers to, and opportunities offered by operator recognition schemes to address organisational sub-optimisation. With respect to one scheme there is a majority view amongst interviewees and survey respondents that there is a lack of consultation regardless of the scale of member organisations. An analysis of the Governance and Standards Advisory Group, set up to monitor operational compliance with the scheme’s standards reveals a lack of sector representativeness; consultation itself is meaningless unless it is in conjunction with a range of members who are representative across the scheme’s membership scale and profiles. The arbitrary nature of scheme amendments also adds to the feelings of member disenfranchisement. Notwithstanding these factors, a member profile with high levels of satisfaction did emerge; medium sized enterprises who were mainly involved in day work in support of major civil engineering projects.

Geographical saturation of schemes is not a necessity for success with regards to environmental benefits; the nature of freight transport operations is that vehicles and operators within a membership accreditation scheme frequently cross geographical boundaries regardless of any schemes in place, thus spreading the reach and impact brought about by scheme membership (e.g. cleaner vehicles, fuel efficient and safe driving practices etc.) and disseminated beyond any regional boundaries. We have identified synergies between these schemes and the American SmartWay (2017) scheme, where it is anticipated that operational and environmental benefits will be achieved on a greater scale as trucks travel across state boundaries, whereby fixed and determined geo-spatiality can be seen as a scheme attribute rather than deserts between scheme fixed areas. Whilst there is some operational cost associated with becoming a member of a voluntary operator recognition scheme, membership has the potential to be a win-win for both operators and policy makers. With operators seeking to improve efficiency and promote best practice; whilst policy makers are tasked with achieving reductions in emissions and addressing sustainability targets. It comes down to getting the right balance so that a natural settlement occurs which reflects the needs of operators and stakeholders.

Given our findings, we reasonably presuppose that compliance schemes are more valuable tools as a locus across sustainability agendas and delivered in partnership for wider stakeholder good. This further positions the importance and potential benefits of Transport Total Quality Management, based upon the preponderance of our evidence as a theoretical position requiring further research. TTQM involves the commoditisation of both autonomously generated data and implicit organisational skills to the overall benefit of customers, be they private or as regulatory bodies. TTQM is not negatively influenced by scale, but improved upon by skill recognition and data optimization. Additionally, our research reveals that a 'one size fits all's policy’ of one scheme works against innovation and continuous improvement. Industry interests are not practically addressed at both extremes of scale, here, a homogeneous approach does little more than deliver imitation rather than the innovative approaches required to improve customer satisfaction. To this end, there are alternative government funded schemes which create more value of shared data and performance indicators, leading to ‘earned recognition’, positive profiling and less likelihood of being stopped and inspected by vehicle and operator inspection agencies such as VOSA in the United Kingdom. These relatively low-cost schemes can autonomously generate performance data on a periodic basis to ‘report upon’ therefore indicating that these extensible enterprise data sets provide more value in real terms to an organisation than commercial schemes, in which many memberships are at the first or introductory level, that has been sought to satisfy customer and project requirements. TTQM becomes more valuable in relation to scale, when framed within structured continuous improvements, responding to internal and external customer feedback in a quality management system. Our research therefore suggests that TTQM as a construct and theory development, depends upon all colleagues in a transport operational agency, whether publicly or privately owned, to advance incrementally and sustainably, with due consideration of all stakeholders via a series of measurements and initiatives.

**REFERENCES**

* *Ahire, S.L. and Golhar, D.Y., (1996) “Quality management in large vs small firms”. Journal of Small Business Management, 34(2), p.1.*
* *Al-Bourini, F., Al-Abdallah, G. and Abou-Moghli, A. (2013) “Organizational Culture and Total Quality Management (TQM)”. International Journal of Business and Management, 8(24), pp. 95-106.*
* *Andrle, S.J. (1994) “Total Quality Management in Public Transportation”. Research Results Digest #3 of the Federal Transit Administration’s Transit Cooperative Research Program. National Research Council, USA*
* *Asif, M. and Gouthier, M.H., (2014) “What service excellence can learn from business excellence models”. Total Quality Management & Business Excellence, 25(5-6), 511-531.*
* *Ates, A., Garengo, P., Cocca, P. and Bititci, U., (2013) “The development of SME managerial practice for effective performance management”. Journal of Small Business and Enterprise Development, 20(1), pp.28-54.*
* *Besterfield, D. H., Michna, C. B., Besterfield, G.H. and Sacre, M. B. (2008) Total quality management (3rd edn). New Delhi: Pearson Education.*
* *Coimbra, E., (2013) Kaizen in logistics and supply chains. McGraw Hill Professional.*
* *Cruz, C. and Montenon, A. (2016) “Implementation and impacts of low emission zones on freight activities in Europe: Local schemes versus national schemes”. Transportation Research Procedia (12), pp.544 – 556.*
* *Dablanc, L. (2008) “Urban goods movement and air quality policy and regulation issues in European Cities”, Journal of Environmental Law, 20 (2), pp. 245-266.*
* *Dahlgaard, J.J. and Mi Dahlgaard-Park, S. (2006) “Lean production, six sigma quality, TQM and company culture”. The TQM magazine, 18(3), pp.263-281.*
* *Deepika, S., Anandakumar, D. and Krishnamoorthy, D. (2016) “Study on Factors Influencing the TQM Practices and its Consequences”. International Journal of Industrial Engineering and Management Science, 6(2), pp. 48-52.*
* *DEFRA (2017) Air quality plan for nitrogen dioxide (NO2) in the UK: setting out the UK’s plan for reducing roadside nitrogen dioxide concentrations.*

[*https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-*](https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-) [*uk-2017*](https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017)*.*

* *Diez, J. and Mohr, R. (2017) “Down to the Wire: Are you ELD-ready?”, Food Logistics, 13 Nov 2017, http://www.foodlogistics.com/article/12380804/down-to-the-wire-are-you-eld-ready.*
* *Driver and Vehicle Standards Authority UK (2006) The Operator Compliance Risk Score Scheme.* [*https://www.gov.uk/operator-compliance-risk-score*](https://www.gov.uk/operator-compliance-risk-score)*.*
* *European Union Transport Commission (2011) Road Freight Transport Vadenecum: Market Trend & Structure of the Road Haulage Sector in the EU 2010.*

*[https://ec.europa.eu/transport/sites/transport/files/modes/road/doc/2010-road-freight-](https://ec.europa.eu/transport/sites/transport/files/modes/road/doc/2010-road-freight-vademecum.pdf)* [*vademecum.pdf*](https://ec.europa.eu/transport/sites/transport/files/modes/road/doc/2010-road-freight-vademecum.pdf)*.*

* *Easterby-Smith, M., Thorpe, R. and Jackson, P.R., (2015) Management and business research. Sage.*
* *Ebrahimi, M. and Sadeghi, M., (2013) “Quality management and performance: An annotated review”. International Journal of Production Research, 51(18), pp.5625-5643.*
* *Hellsten, U. and Klefsjö, B. (2000) “TQM as a management system consisting of values, techniques and tools”. The TQM Magazine, 12(4), pp. 238-244.*
* *Islam, Z. D. M., Zunder, T. H. (2014) “The necessity for a new quality standard for freight transport and logistics in Europe”, European Transportation Research Review, 6, pp. 397-410.*
* *INTEREG (2013) Sustainable Urban Goods logistics Achieved by Regional and local policies.* [*http://www.sugarlogistics.eu/*](http://www.sugarlogistics.eu/)*.*
* *Jonsen, K. and Jehn, K.A., (2009) “Using triangulation to validate themes in qualitative studies”. Qualitative Research in Organizations and Management: An International Journal, 4(2), 123-150.*
* *Karuppusami, G. & Gandhinathan, R. (2006) “Pareto analysis of critical success factors of total quality management: A literature review and analysis”, The TQM Magazine, 18(4), pp. 372- 385.*
* *Kaynak, H., (2003) “The relationship between total quality management practices and their effects on firm performance”. Journal of Operations Management, 21(4), pp.405-435.*
* *Oakland, J.S. (2014) Total quality management and operational excellence: text with cases. Routledge.*
* *Parish, R. J. (1997) “Service level agreements as a contributor to TQM goals”, Logistics Information Management, 10(6), pp. 284-288.*
* *Piecyk, M.I. and McKinnon, A.C. (2010) “Forecasting the carbon footprint of road freight transport in 2020”. International Journal of Production Economics,128(1), 31-42.*
* *SmartWay (2017) ‘Learn about SmartWay’, United States Environmental Protection Agency, 18 Sept 2017,* [*https://www.epa.gov/smartway/learn-about-smartway*](https://www.epa.gov/smartway/learn-about-smartway)
* *Sousa, R. and Voss, C.A., (2002) “Quality management re-visited: a reflective review and agenda for future research”. Journal of Operations Management, 20(1), pp.91-109.*
* *Tam. C.M. and Moses, Y.T. Hui (1996) “Total quality management in a public transport organisation in Hong Kong”. International Journal of Project Management Vol. 14, No. 5, pp. 311-315.*
* *TFL (2010) Freight Operator Recognition Scheme. Transport for London.*
* *Yin, R. K. (2014) Case study research: design and methods. 5th edn. Thousand Oaks, Calif.: Sage Publications, Applied social research methods series.*