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The surprising story of Dr Rudolf Diesel

Rod Ashley

The Association's meeting of 23 April 2022 was addressed by the chair, Rod Ashley, on the theme of Dr Diesel. The paper below is based on his presentation, including some illustrations from it.

Reports of the demise of the diesel engine have been circulating for some time, but this article looks at the life, achievements and death of its eponymous inventor, Dr Rudolf Diesel. A number of writers have come to certain conclusions about his life, but closer examination reveals some ambiguities about the driving forces behind this influential engineer.

The known knowns

It is generally agreed that Rudolf Diesel was a fine engineer (in his own view a 'thermal engineer') whose inventions transformed industry and industrial applications globally. However, the principal application for which he is now known was not necessarily how he envisaged the deployment of his engine, as we shall see.

Born in March 1858 to a Bavarian family, Rudolf Diesel grew up in Paris where, at age 12, with the outbreak of the Franco-Prussian war, the family was forced to leave France. After a short time in London, young Rudolf was despatched to relatives in his father's hometown of Augsburg, near Munich to learn German. Under the tutelage of his 'foster father' Professor Barnichel, he developed interests and skills in mechanical and technical drawing. At this young age he had already demonstrated his desire to become an engineer and from Konigliche Kreis-Gewerbeschule (Royal County Trade School, which also had a strong arts basis) he progressed to Munich Technical University, gaining in 1880 the highest degree result awarded by the university since it was established. In particular, he had been attracted to the lectures on thermodynamics by Dr Carl von Linde.

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The Editor is always interested in hearing from members and non-members who would like to write an original piece about transport history and/or research for inclusion in this journal or online.

Diesel progressed to become an apprentice at the Sulzer Engine Works in Winterthur, Switzerland, building refrigeration machines and steam engines, in the process nearly being killed by an explosion when experimenting with ammonia as a fuel.

Before long he proceeded to work for his old lecturer's refrigeration company, Linde AG, which was to become a European leader in the new science of refrigeration. By 1881, having patented a transparent ice-making process, Diesel transferred to the Paris ice-plant established by Linde. Thus was set Diesel's career in devising and refining engines based on heat transfer. In 1893 he was granted a patent (DRP 82 168) as a result of a scientific paper snappily-entitled "Theory and Construction of a Rational Heat Engine to Replace the Steam Engine and Contemporary Piston Engine". He described his new engine as a 'compression ignition engine' – which clearly explains the principle upon which diesel engines work. Rather than a spark igniting the fuel mix as in a petrol engine, the fuel is introduced into a piston which has been heated intensely by the very high compression of air.

A significant aspect of this engine was its use for stationery engines. It was some years before Diesel envisaged the engines' deployment in various modes of transport. Indeed, Diesel was greatly motivated by noting that factory workers spent much time as slaves to their machines – feeding them with coal to maintain heat and pressure. Whilst he disagreed profoundly with Marx's topical view of

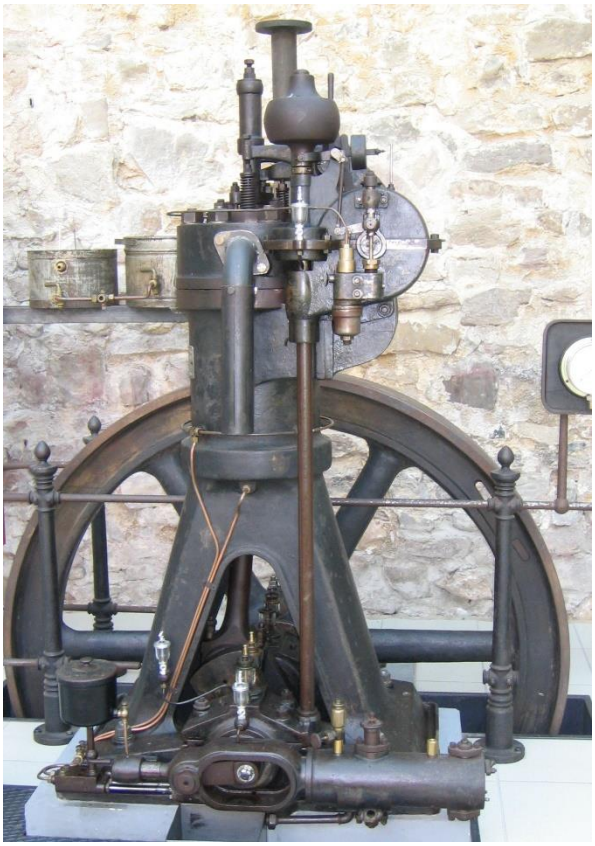
capitalism, he also felt strongly[1] that workers deserved better than servitude to machines and, driven by his Lutheran principles, he felt that his invention could improve the lot of factory workers.

Rudolf Diesel argued that such a design had a number of advantages: he calculated that it could be as much as 75% efficient (whereas a contemporary steam engine was merely 10% efficient, wasting 90% into the atmosphere) and that it could run on a variety of fuels. Striving always for improvement, Diesel modified the design and was granted a second patent in 1893. But, in fact, the greatest efficiency he ever achieved with his engines was just 26% -- nevertheless, as he announced defensively, this was considerably more efficient than his competitors' efforts.

His engineering successes led him to transfer to the Augsburg Machine Works where, from 1893, Diesel developed an engine which would become the prototype for use in a variety of settings. By 1898, the Augsberg 'diesel engine' factory had been built for the company which morphed into MAN, the truck company which built its first diesel truck in 1924. Yet his own work was to make him a millionaire five times over by the end of the century.

Fuel sources

What is less known is the choice of fuel sources by Diesel. It is often assumed that he used a specific formulation of refined fossil fuel for his engine. Many writings on diesel vehicles start with the presumption that, from the design outset, this fuel would provide the motive power. Anyone who has refuelled a modern



Above: *Colour photo of Diesel's 1906 engine [Credit: Flominator, Wikimedia]*

diesel knows that it looks and smells different from petrol. Inadvertent spillage over clothing or a forecourt leads to staining and potentially sticky footwear as well as an unpleasant smell. Even if it has proven an effective fuel for over a century, it was not always the default fuel for a diesel engine.

In fact, Diesel and his engineers experimented with a variety of fuels for his engine. He was devoted to checking the quality of heat and burn, fuel flow and atomisation and spraying. He was also concerned about fuel residue, together with the amount of fumes produced as a by-product, as well as versatility and economy. He was constantly searching for the cleanest, most complete burn and low emissions. Early experimentation used fuel

[1] Nitske W R & Morrow Wilson C. (1965). *Rudolf Diesel: Pioneer of the Age of Power*. University of Oklahoma Press. p34, 75

types comprising liquids, gas and dust formulations. He tried: gasoline (benzene and ligroine), kerosene, soft-coal oils, naptha, pure alcohol, hard-coal oils (creosote and benzole), shale oil; illuminating gas; and coal-dust fuel. Later experimentation included butter, bituminous coal, castor oil, palm oil, lard, and various vegetable oils. He noted:

"The use of vegetable oils for engine fuels may seem insignificant today. But such oils may become in the course of time as important as petroleum and the coal tar products of the present time."[2]

Indeed, Diesel perceived vegetable oil or peanut oil to be the main fuel sources. It was to take a hundred years before biofuels became common practice – today McDonalds' trucks in the UK pronounce that they run on recycled cooking oil from their kitchens.

Diesel's character

Reports of his early life and as a young man show Diesel as a 'Renaissance Man'. Being of German stock but raised in Paris and briefly in London, he spoke three languages well; he displayed an interest in art and was a gifted and precise illustrator (as the mathematical and geometrical plans for his engines showed). He loved music, was an accomplished pianist and, during periods of illness, he took pleasure in concerts and art galleries. His letters to his wife[3] whilst he was away on business trips show a tenderness and sensitivity, even a poetic phrasing.

As suggested, there was a strong social purpose driving Diesel's engines, not just engineering prowess. He argued that stationery engines based in factories should replace steam engines and have a human perspective: to ease workers' tasks. Diesel was interested in socialism and was familiar with writings of socialist thinkers, particularly those of Proudhon, with whom he shared the project of a decentralised economy based on workers' cooperatives. By developing a small engine – cheaper, less complex, easier to maintain and more reliable than a steam engine – Diesel believed he could rebalance the economy, giving handicrafts a new chance and revitalising the rural world:

"It is undoubtedly preferable to decentralise small industry and establish it in the countryside instead of concentrating it in large, overcrowded cities, without air, without light and without space. This goal can only be achieved by an independent machine, easy to use and maintain."

In his factory management techniques Diesel was what today's management writers would call 'enlightened'. He trusted his workers, praised them, and came to rely on a small number of them to remedy problems with engine installations. So, why does the US engineering historian John Lienhard (University of Houston) see the seeds of Rudolf Diesel's downfall at this stage of his career, portraying him as a prickly, defensive, and dismissive prima donna in the workplace? Whilst Diesel saw his own development work on the 'oil engine' as a continuation of the inventive process, he is portrayed by Lienhard as viewing the innovation needed to bring the invention successfully to market as beneath him – suitable only for inferior intellects to his own – whilst sneering at other engineers' work. A more careful reading of Diesel's life does reveal an impatient and ill-tempered Diesel but this facet can be traced perhaps to his regular succumbing to severe headaches which would dominate his later life and his

[2] Nitske & Morrow Wilson. Op. cit. p210.

[3] Quoted throughout Nitske & Morrow Wilson. Op. cit.

whole being. Indeed, many commentators acknowledge that Diesel was subject to debilitating headaches and also episodes of gout, a very painful condition affecting his mobility. Not surprisingly, these conditions impacted upon his mood, his intense work-rate, and his priorities. At times, he needed to recover from melancholy in a Swiss sanatorium and, today, he would probably be diagnosed as suffering from periodic depression.

Diesel made considerable sales of static engines in the USA, principally to the Anheuser-Busch (Budweiser) brewery in Milwaukee, which in 1912 accounted for 50% of US sales. A telling meeting was between Diesel and fellow-inventor Thomas Edison[4], in which Diesel was rebuked by the waspish Edison for his invention as to "whether what a dozen engine inventors bring together was going to be worth a dime when brought together". Diesel's reported restrained composure shows a refined man with broad interests and scholarly training.

As outlined, Diesel's vision throughout was that his engine would assist small companies and artisans as it would be more efficient than the steam engines they currently used. He did not initially have transportation in mind but diesel locomotives were to transform the railways later, just as diesel replaced coal in ships. By 1912, the year before his death, there were 70,000 diesel engines in use around the world[5]. Widespread use of diesel engines for commercial haulage and passenger road transport only started after his death (particularly after Robert Bosch Gmbh developed in 1927 a fuel injection system which synchronised the metering of fuel with the speed of the engine). During the Second World War, most military and commercial vehicles were still petrol-powered.

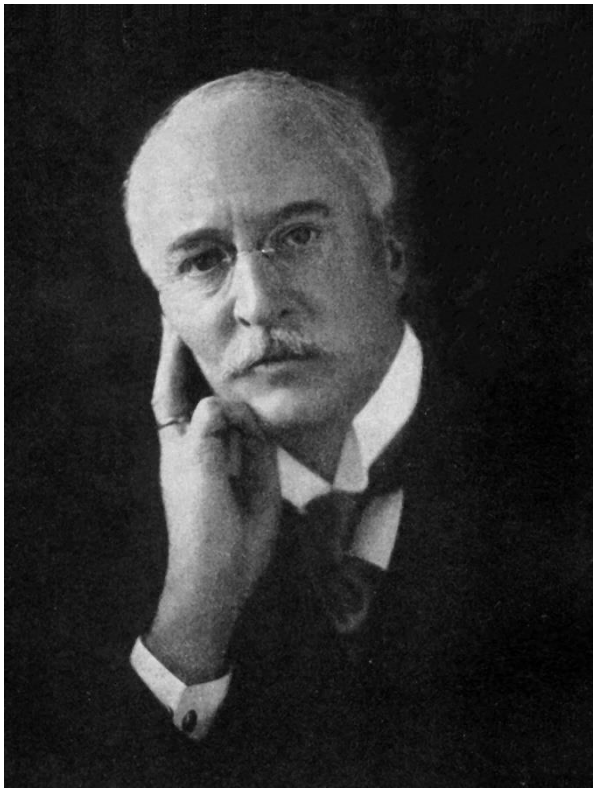
Unknown unknowns: The nature of Rudolf Diesel's death

The big shock about Rudolf Diesel was to come in the run-up to the First World War. He had already convinced the German navy to use diesel power on U-boats[6] and had predicted that diesel engines might be the death-knell of the British coal industry as shipping companies switched to diesel. As part of this emerging shift from coal, Diesel was invited to a meeting in September 1913 in London with Consolidated Diesel Manufacturing to discuss the possible adoption of his engine for British navy submarines. On 29 September 1913 he left Antwerp aboard HMS Dresden, bound for Harwich. He ate dinner and instructed the porter to wake him at 6.15 the next morning. As the New York Times reported: "On the arrival of the vessel at 6 o'clock this morning, his bed had not been slept in, though his night attire was laid out on it." Additionally, in his cabin desk, Diesel's diary lay open at that date, displaying a small cross drawn on the 29 September entry. Later his coat with his hat

[4] Nitske & Morrow Wilson. Op. cit. p232/233.
[5] According to History.com
[6] "…all the German submarines from U-19 onwards were driven by heavy-oil engines, the German Admiralty having obtained as far back as 1911 a satisfactory four-engine from the Augsburg works" H.C.Bywater and H.C.Ferraby *Strange Intelligence: Memoirs of Naval Secret Service* Constable, London, 1931, p225. This book also provides parallels with the role of intelligence in World Wars One and Two. Whilst the technology in the latter was far more sophisticated, the rigid working practices of the Germans often provided a useful entry point for British intelligence. For example, installation of the engine in U-19 at Kiel was associated with the assembly shop being barricaded off and plastered with notices threatening trespassers. News of this was picked up and an agent followed it up, eventually obtaining full details of the new engine (*ibid,* page 91). *Ed*.

resting on it were found by the railing at the ship's stern.

Officially, Diesel's death was classified as a suicide, having apparently thrown himself overboard. But why would a successful engineer, a millionaire, apparently on the brink of a possible deal with the British government, kill himself? Wild conspiracy theories circulated that it was variously: German spies concerned that he would leak details of U-boats to the British government; it was big oil companies concerned that customers might use Diesel's vision of vegetable oil or peanut oil for fuel rather than fossil fuel; or it was British coal mine owners determined that coal should continue to be the main fuel for shipping. Needless to say, no real substance to any of these claims was ever discovered. Nor was there a body upon which to perform a post-mortem examination. A badly-decomposed body was found ten days later by a Dutch ship in Norwegian waters, from which certain items in pockets were removed. These items (an ID card, a spectacle case and a pocket knife) were subsequently confirmed by his son Eugen as belonging to Diesel. However, the body was so putrefied that the sailors could not bear the idea of storing it on-board and returned it promptly to the deep.



Above: *The older Rudolf Diesel. This shows a well-groomed man of composure. [Credit: Wikimedia]*

However, suicide is not an absolute given. The parting note for his wife Martha was accompanied by an elegant present, an overnight travelling case; indeed, his parting from her was affectionate. Whilst Diesel was a man of great diligence in many of his dealings, he had left no will. He had deliberately booked a 1st class carriage on the slow train from Frankfurt to Ghent, choosing as his reading matter a large volume of Schopenhauer's philosophy – subsequently found with a bookmark in the section dealing with wealth and capital. He had booked as his London stay his favourite hotel, de Keysers, and had arranged a dinner with his good friend, the ship designer Sir Charles Parsons. None of these actions tally with a man intent on suicide. His letter to Martha from the overnight hotel in Ghent is strange: 'strange, poetic and beautiful', possibly suggesting that he is ill according to Nitske and Morrow. Whilst mostly in German, it is partly in French. Significantly, it is misaddressed to his

daughter in Frankfurt, not Martha in Munich. Had Martha received it in time, would she have deduced that he was ill and been able to prevent his cross-channel travel? And yet, prior to leaving Munich, there were bizarre conversations with son Eugen – demonstrating to him the keys to all the house rooms and document drawers, and a trip to Starnberger See, the site of the Bavarian king Ludwig II's drowning, discussing the concept of suicide.

It later transpired that, although a millionaire, Diesel had made some disastrous investments latterly and was on the point of bankruptcy. Indeed, he had a history of poor investments in oilfields, particularly those owned by the Swedish Nobel family in Azerbeijan. Additionally, he had been diagnosed with significant health problems. Before departing on his journey to London, Diesel had left a bag with his wife, instructing her not to open it for another week. When she did so, she discovered financial documentation confirming that he was close to bankruptcy.

Rudolf Diesel's legacy is enormous – an engineer who had huge influence on industry and on many modes of transport. A century later we have seen the vilification of the engine he invented – or more accurately, of the exhaust particulates emitted. But a fundamental question remains. Had Diesel's original vision of an engine powered by vegetable or peanut oil been adopted, would the world have taken a different direction? Instead of wars over fossil fuel-producing regions of the Middle East or Russia, would the tensions have been instead over land suitable for peanut production? Like the truth about Diesel's death, we will never know.

Above: 2017 registered modern Scania biofuel bus in Bristol First West of England's biogas-powered 39401 (an Enviro400 City with Scania power unit) at Cribbs Causeway on route 2 across Bristol to Stockwood. [Credit: Geof Sheppard, Wikimedia]

References:

Few books in English about Dr Diesel have been written but this US title provides an interesting comparison with American inventors of the same era. It also contains an extensive bibliography of books and articles (many in German):

Nitske W R & Morrow Wilson C. (1965). Rudolf Diesel: Pioneer of the Age of Power. University of Oklahoma Press.

There are plenty of magazine article and web-based materials:

https://www.smithsonianmag.com/smart-news/when-inventor-diesel-engine-disappeared-180960635/

https://uh.edu/engines/epi1435.htm (by John H Lienhard)

https://www.bbc.co.uk/news/business-38302874

https://www.dieselworldmag.com/departments/under-pressure-the-life-and-death-of-rudolf-diesel/

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1906 Engine:
https://commons.wikimedia.org/wiki/File:Dieselmotor_vs.jpg

Enviro400 City:
https://commons.wikimedia.org/wiki/File:Cribbs_Causeway_-_First_39401_(YN17OHP).JPG

D. N. Chester revisited

Peter White

The publication of 'Public Control of Road Passenger Transport' by Manchester University Press in 1936 marked what was probably the first systematic review of the regulation of public road passenger transport (buses, trams, trolleybuses and coaches). The author, D. N. Chester, was a member of the University's Economics Research Section. Although a substantial volume, at 225 pages, which takes some time to read, it is written in a straightforward style, requiring little prior knowledge of economic theory. Another contrast with current academic writing is that little space is taken up with extensive referencing to previous work by other academics (there being little prior work to cite) – many recent academic papers at times seem to turn into a list of references, which makes it difficult to follow the author's line of reasoning.

Re-reading this work provides not only an insight into conditions at the time, but some interesting parallels with more recent events. The 1930 Road Traffic Act [hereinafter RTA] had come into effect in 1931, replacing a varied mix of regulation by local authorities with a common system throughout mainland Britain, administered by regional Traffic Commissioners, with a right of appeal to the Minister of Transport (p73). Its general effect was to protect incumbent operators, and to encourage extensive mergers within the sector. Such an approach was radically reversed under the Transport Act of 1985, effective from October 1986, which deregulated local bus services, following earlier deregulation of the coach sector in 1980. This itself is now being reversed in respect of local bus services through a renewed emphasis on co-ordination of services, either through franchising (as now being introduced in Manchester) or, more widely, Enhanced Partnerships.

In addition to analyses of changes, Chester's work also provides many useful statistical tables, enabling comparison with more recent performance. References are generally shown below as page numbers (as 'p3' etc) or to tables separately numbered within each chapter.

Standardisation of rules

The system of regulation by local authorities had been highly erratic in its application, drawing on powers from the Town Police Clauses Acts of 1847 and 1889. No county councils and only 65 of out 644 rural district councils had such powers, leading to little regulation of services in such areas except where services entered towns which did exercise their powers (pp69-70). The latter were often used to protect local authority-owned operators where they existed, rather than promote a wider passenger interest. There was also a wide range of variation in enforcement of safety standards (see 'Total fleet size' below). The RTA could be seen as providing a welcome degree of harmonisation and removal of directly political interference in service licensing decisions.

Overall trends

Following rapid growth in the 1920s, Public Service Vehicles (PSVs) already accounted for the majority of public transport trips in 1932, a total of 5,344 million (table I, p5). To compare with bus and coach use today one would have to add tramways (3,844m) and 'trackless trolleys' (221m) whose function is now covered by local bus services (apart from a modest contribution from modern light rail systems). This already exceeded railways at 1,557m, although as Chester notes, average revenue per trip was much higher for rail, implying a

greater average trip length (passenger miles stats were not then produced). A further adjustment in making comparisons with the present day is needed in that only statistics for local bus services are now published. Hence one needs to deduct the other categories (express, excursions & tours, contract) which totalled about 83m in 1933 (p10, table I) to give about 9317m trips. This is clearly much greater than the current combined total for buses and light rail in 2018-19 (i.e. prior to Covid) of about 5063m (from DfT tables LRT0101 and Bus0103) despite a greater total population. This is clearly attributable to the vast increase in car ownership and changing activity patterns. In addition, as real wages are now much higher, a labour-intensive industry such as buses will display higher costs, reflected in real fare levels.

Chester suggests that a substantial decline in the number of taxis had taken place, with a shift of demand to buses, although no specific data are quoted (p4).

Total fleet size and staffing

Chester's account shows that a marked contraction in fleet size took place in the early 1930s, following introduction of the RTA. The main factor in this was vehicles failing to meet the new stricter safety standards being enforced for vehicles of 8 seats and over, in part due to vehicles failing at inspection, but to a greater degree from operators withdrawing their vehicles from the inspection process following realisation that they were unwilling to pass. Concern was expressed regarding some vehicles being downseated to below 8 seats to avoid the stricter requirements, notably in Northern Scotland (p84). Following growth in 1929 and 1930, total PSV fleet size declined from 50,443 in 1931-32 to 46,384 in 1933-34 (Table I, p87). Deliberate measures by Traffic Commissioners to reduce perceived 'over capacity' also played a part.

Nonetheless, total seating capacity rose due to a rise in average vehicle size, and due to an increase in average miles per vehicle per annum - to 28,652 in 1933 - total seat-miles per annum grew (p88). In the absence of data on distances covered by non-local services, one cannot calculate a current direct equivalent to this average. Nonetheless, it can be shown that in 2019 the figure was about 55,000 km per annum (derived from DfT tables 0203 and 0601), or in miles about 34,000, a slightly higher figure than in 1933 (which may be attributed in part to the speed limit for buses and coaches then being only 30 mph on all roads, and also that vehicles on seasonal express, excursions and tours work may have had lower utilisation than others). However, the distribution by day of week and time of day may be very different - evening and Sunday services are now very limited in many areas, whereas a glance at timetables from the early 1930s shows high frequencies at such times. Conversely, there is less 'peaking' of supply during the working day Monday-Friday.

A somewhat surprising development in the early 1930s was an increase in driving and conducting staff per bus, drivers rising from 1.55 to 1.91, and conductors from 1.23 to 1.49 (vehicles of 20 seats or under did not require a conductor), i.e. faster than miles per vehicle, indicating a fall in productivity (pp93-94, 101). In contrast to current economic policy, employers were required to pay "fair wages" (p97). Enforcing working hours regulations was problematic (pp95/6).

Costing and pricing

Chester outlines the main cost components for running a service, noting that a substantial

proportion varied with time of operation (and hence inversely with speed), and also vehicle size, with a table to illustrate the latter (pp14-17) – a 64-seater had a cost per vehicle-mile 105% higher than a 14-seater, but of course a very much lower cost per seat-mile. Ironically, the industry seemed to forget much of this, having adopted by the 1950s a rigid average cost per bus-mile approach in calculating route profitability, which led to many rural services being cut back that did not appear to have been viable. In effect, Chester's findings were rediscovered in the NBC-CIPFA costing system of the 1970s. He also speculated on how sensitive demand was to fares charged, but little evidence was available at that time (p14). Another factor he noted was that there was little evidence for economies of scale (p57), but that large 'combine' groups might have advantages in bulk purchase of materials, an aspect which has re-emerged in the extensive amalgamations following the initial separate sales of regional bus companies and most municipals under privatisation policies. Chester suggests an average bus load of about 12 (p62) - broadly similar to current overall averages of about 9 outside London and 14 in London (pre-Covid) – but these are now against a much higher average vehicle size, leading to much lower percentage load factor.

Local authority services

The complex legal position regarding local authorities' powers to run their own services is discussed (Chapter III). A separate Act of Parliament was generally required, and the degree to which authorities were able to run services beyond their statutory boundaries varied widely (in some cases, even limited to certain routes within their boundary). This was simplified by the RTA, giving authorities the right to run throughout their area, and empowering Traffic Commissioners to grant powers for extra-area services (the majority, but not all, of such applications being granted) (p21). However, the extent of contract or hire operations by local authorities was very limited (p23). The extent of joint undertakings such as Burnley Colne and Nelson is described, along with arrangements involving the railways such as Sheffield (pp25-29).

Private operations

Even by the early 1930s many features of the current pattern had emerged (chapter IV). Small independents tended to concentrate on local services in rural areas and contract work, stage carriage being increasingly dominated by the larger 'territorial' companies, notably the Tilling–BAT group (Table III, Chapter V, p51). A striking feature of the latter was the inter-locking directorships between subsidiaries – on average, each director was concerned with 2 or 3 companies (p40)

Statutory Control

Part II of the book (all remaining chapters) focuses on this issue. Control of competition resulted in rationalisation of services through the pattern of awarding licences, with which readers will be familiar through already well-documented histories of bus operators. This was also associated with the pressure to reduce bus services in busy areas due to perceived 'congestion' caused by PSVs (pp63, 144). Public views at the time seemed to see this as vehicle size issue, rather than the road space taken per person moved, which is of course far less for buses and coaches than private cars. In asking the question 'why the arguments that competition produces a wasteful and uncoordinated system have been successful in justifying state regulation than in the case of other and industries?' his response is that 'Probably the main reason is that the road transport industry involves use of the public highway' (p65). However, he also notes that

'The public service vehicle is now submitted to control far stricter than that of the private car, and although there are reasons for some differential treatment, it may be seriously questioned whether some of the present difference is not anomalous' (p68).

Roles of the Commissioners

At March 1934 there were 12 Traffic Areas, an earlier Southern area having been absorbed by others. There were still separate Areas for North and South Scotland at that time (p71), later merged. The Minister of Transport had wide-ranging powers, including appointment of the individual Commissioners and their staff, determining appeals, and also issuing general directives (pp75/6). A table of the outcome of valid appeals against Commissioners' decisions on road service licences shows that in the period 1931-34 38.6% were reversed or modified, 38.2% upheld, and 23.2% withdrawn (p81).

The Commissioners had a very wide discretion to refuse a licence, with the RTA tending to favour a reduction in services (p106), more specifically "the elimination of unnecessary services" (p113). As well documented elsewhere, this led to numerous cases of applications being refused particularly for operators with a less reliable record of operation. Railways tended to be protected, whilst tram and trolleybus services were also subject to less restriction than bus services (pp134-138).

Fares control was also applied by the Traffic Commissioners, in principle being able to set upper and lower limits (pp152/3). However, no such controls applied to rail fares, with railways being able to offer reduced fares in competition.

Coach services

Whereas local bus services had developed from before World War One in some cases, and very extensively from the early 1920s, coach services developed somewhat later, from the mid-1920s, as improved roads and pneumatic tyres made long-distance services more attractive. Whilst local authorities imposed some restrictions, many services were able to develop with relatively little restraint, leading to very rapid growth by 1930. The RTA introduced explicit definitions of service types, 'express' being scheduled services carrying passengers at separate fares, 'excursions and tours' running to specified destinations at separate fares, and both subject to quantity and price regulation. Conversely, private hire and contracts (where the whole vehicle is hired out to a customer such as a school or employer) were not subject to quantity or price controls. Express services were distinguished from 'stage' (local) services by the minimum fare charged, of one shilling [5p] (p7) – this principle remained until the reform of 1980 (then on the princely sum of 25p!), resulting in distortion of statistics as many short-distance services were also included. Chester notes that excursions and tours were not a separate licence category, but a sub-category of 'express' (p7). It could be argued that the 1930 Act had a more restrictive effect on the coach sector than local buses, since it was at an earlier stage of its development whereas local buses had already reached the stage of providing a very comprehensive network by 1930.

Chester devotes considerable coverage to the coach sector, and extensive statistical data as operators were required to submit these on passenger trips, revenue and vehicle-miles run. Regrettably, these are no longer required, hence we can be clearer about activities in the early 1930s than the 2020s.

The RTA has marked effects on express services in particular, notably in limiting duplicate vehicles and enabling railway companies to object to RSL applications, without scope for bus and coach operators to object to changes in services and fares by railway companies (pp156/7). He also documented that coaches typically offered a slower but cheaper service where paralleling railways, a sample of 94 cases showing that single fares were on average 33.7% below those for rail, and for period returns 18.3% (p165), broadly similar to current contrasts on trunk routes.

Protection of existing services

A feature which had developed prior 1930 was that of 'protecting' existing services against the effects of parallel competition. This was found particularly in cases of tramways operated by local authorities, which used their regulatory powers to limit the scope for parallel bus services (especially those originating from outside the area) to carry local passengers. The 1930 Act effectively endorsed this practice. Chester reviews protection primarily in terms of different types of services being protected, including longer distance services being prohibited from picking up or setting down passengers within a section also covered by existing local services such as tramways, and, more commonly, imposing fare higher than that which was charged on those services. A case in Middlesbrough is cited as an example (p121), in which the minimum fare was set higher than the maximum fare on the local service. The alternative was to allow short-distance fares, but again set at levels higher than the corresponding rates on the local services, the example cited being that of the Halifax Joint Committee whose local bus service was protected in this manner, as successor to the tramway service. Chester also found extensive examples of protection of both local bus services and railways against price competition from express and excursion coaches.

Tramways and 'Trackless Trolleys' are considered separately, notably in the case of Leicester Corporation and Midland Red, in which the latter appealed against a restriction on carrying any local passengers within 440 yards of the corporation's bus services (as a successor to the tramway). The Minister indicated that "The existence of tramway and trolley vehicle services, which may be rendered unremunerative by unrestricted competition on the part of omnibuses, is one of the considerations which in many cases need to be taken into account". Protection by fares measures rather than absolute prohibitions on picking up and setting down appeared to be favoured. Chester also examines cases where requests to lower fares on longer-distance services were opposed.

In commenting on these matters toward the end of his book, Chester noted that "The ease with which tramways can be protected from competition has undoubtedly favoured them. The effect of restraining bus competition in this case has been to slow down the abolition of tramways…." (p208). He further noted that "… it is possible to find cases where a municipal tram service is given protection against the municipal local bus service which in turn is protected against a private bus service" (p209).

Such protection ceased with the reforms of 1986, and somewhat earlier in respect of fares, which were decontrolled from 1980. It undoubtedly had strange effects, preventing or discouraging passengers from using a parallel service, even where it might be more frequent than a poorly-used local facility. However, the 1985 Act went from one extreme to another by also making it difficult for operators to enter into voluntary agreements enabling co-

ordinated timetabling and common fares over such sections which were of benefit to users.

Chester's conclusions

He saw, perhaps surprisingly, a possible deterrence to larger operators ousting smaller ones, in that fierce competition that existed previously was no longer possible, also noting that "… the restriction on new entrants has added to an increased value to the goodwill of an established service which may be so high as eliminate the possible financial gain from acquisition" (p181). He also noted an inconsistency between regulation of railways, tramways, and trolleybuses vis a vis motor bus services, in that the three first categories gained indefinite powers to operate, whereas motor buses were subject to periodic licence renewal. Restriction of new entrants was a major outcome (p198). A broader matter of concern was the risk of innovation and efficiency gains being deterred as a result (p198). One option not considered at that time was competitive contracting of services within a co-ordinated public network, so that the more efficient operators bid successfully for contract services, whilst the benefits of a co-ordinated public network can be retained, as can be seen in the current TfL system and planned 'franchising' under 2017 Act (albeit with debate on whether other types of operator innovation might be deterred as a result).

Concluding thoughts

One conclusion that might be drawn from the sequence of changes over the decades is that we are simply seeing a repeated cycle of policies, as Prof Ken Gwilliam of Leeds University has suggested. Thus the initial complexity of the 1920s was replaced by the strict regulation of capacity and pricing under the 1930 Act. The rigidities that this caused led to the changes in the 1980s, and in turn problems arising from these to the present changes. This may have parallels with broader history, in which one can see a worrying similarity to the 1930s in economic instability leading to protectionism and nationalism. Perhaps a more optimistic view would be that we do learn something from past experience (otherwise, what is the point of research?). Rather than a cycle on a flat plane, we may have an upward spiral, in which the same phenomena recur (such as deregulation and re-regulation) but with a gain in knowledge from previous experience, enabling lessons from all types of regulation to be retained, and combined productively.

Viewpoints and opinions expressed by contributors to this Journal should be seen as the personal views of the authors, and do not necessarily reflect the views of the Association.

October 2022 conference in Coventry cancelled

As you will recall, we arranged a meeting in Coventry for all association members for Saturday 8 October. This would have been our first F2F event since Covid lockdown in 2020.
Unfortunately, registrations for the event were exceptionally low despite advertising it. Therefore, in early September we reluctantly cancelled this F2F event, as previously notified. However, we are replacing it with a Zoom event on the same day.

Saturday 8 October, 11.00-12.30. Free of charge to RTHA members.
This is a single-issue item: To present to members of the association the results of the working party deliberations about the future direction of RTHA.

We hope that you will be able to join us for this important presentation. Please register your interest as soon as possible with John Ashley: john@globespinner.net.

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