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# The Problems and Prospects in Ireland

by

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by D. J. Reynolds*

The road problems and prospects in Ireland within the next 10 years or so seem likely to arise from two main sources :—

(i) The trends in road vehicle ownership and operation; in particular the growth of private transport, and its impact on other sectors of transport, especially on public transport, including the railways which will be the subject of a separate study. In addition the adjustment and expansion of the road system to accommodate rising traffic volumes must be considered.

(ii) The structure of road transport, the legal conditions under which road vehicles operate and the extent to which, in the light of current trends, the legitimate transport requirements of the community are likely to be met.

## THE GROWTH OF ROAD VEHICLES AND TRAFFIC

It has been pointed out in a previous report[1] that the rate of growth of road vehicles, at an average rate of 7.7 per cent. per annum over the 10 years 1951–61 has been rapid. It is conventional in these circumstances to project past rates of growth into the future, giving in this case an approximate doubling of road vehicles in the next 10 years. In these studies of all major sectors of inland transport, however, it is desirable to delve beneath such bare facts (as far as information will allow) and to examine more fundamental trends in order to assess their full significance for the particular sectors of transport.

Considering the growth of road passenger transport it has been established as a general rule that as people become wealthier and real incomes per head rise, their travel tends to increase. Thus, Leser shows an income elasticity of demand for travel and holidays in Ireland of 2.6.[2] This general increase in personal travel may occur in either or both of two sectors† public transport (both road and rail) and private transport, i.e., the car and the motor-cycle of which the car is by far the most important in Ireland accounting for some 90 per cent. of private passenger mileage.[1]

### The Growth of Private Passenger Transport

Of the two sectors there is abundant evidence that the private sector is by far the most expansionary. Thus in Europe the number of private cars and taxis registered increased by 117 per cent. between 1954 and 1960 and out of 22 countries the only countries to show an increase of less than 70 per cent. in the period were Turkey and Ireland itself, where the increase was 41 per cent. (6.0 per cent. per annum)[3]. Over the same period motor-cycles increased by 86 per cent. in Europe and by 176 per cent. in Ireland.[3]

Concentrating on the increase in private cars it is customary to attribute their historical growth to increasing real incomes per head and high income elasticities of demand. Thus in Europe incomes per head increased by 24 per cent. from 1954 to 1960 and population by 7 per cent., suggesting (with an increase in cars of 117 per cent.) an income elasticity of demand of about 3.[3] Similarly, income per head in Ireland increased by 8 per cent. over the same period and population declined by about 4 per cent., suggesting (with a 41 per cent. increase in cars) an income elasticity of about 5.[3] However, there were probably factors at work other than increasing incomes per head and high income elasticities to explain the historical growth of the car population. In particular the increase in the supply of cars since 1954, falling real costs of car ownership, technical advance, and emulation effects probably account for much of the historical growth of the car population. In fact, more precise estimates suggest lower income elasticities of demand for private cars, than those suggested by cruder historical comparisons. Thus, the National Institute of Economic and Social Research, London,[4] from a comparison of national product and car ownership in Western Europe, estimate an income-ownership elasticity of $2\frac{1}{2}$ with a time trend of 5 per cent. per year.

Using another approach, income elasticities of demand for private cars derived from studies of the proportions of different income groups at any one time who own cars in many countries suggest income elasticities of about 1.66.[5] An example of this kind of approach is given in Table 1 from a survey of the ownership of cars in Great Britain in 1952.[6]

*The author of this paper is a Research Officer of The Economic Research Institute. The paper has been accepted for publication by the Institute. The author is responsible for the contents of the paper including the views expressed therein.

†A decline in one sector is of course possible.

TABLE 1 : OWNERSHIP OF CARS IN GREAT BRITAIN 1952

| Range of income before tax £ (1) | Percentage of income receivers owning cars (2) | Approximate number of incomes in each range 000's (3) | Number of cars owned by income receivers in each range 000's (4) |
|---|---|---|---|
| Under 200 | 1 | 5,330 | 53 |
| 200– 399 | 4 | 7,770 | 310 |
| 400– 599 | 10 | 5,770 | 577 |
| 600– 999 | 19 | 2,440 | 464 |
| 1,000– 1,999 | 44 | 670 | 293 |
| 2,000 and over .. | 76 | 220 | 169 |
| | | | 1,866 |

The data given in Table 1 although referring to a period when there were only 50 cars per 1,000 population in Britain (as compared with about 120 per 1,000 and 66 per 1,000 in Ireland in 1961) nevertheless illustrates the rapid increase in the proportion owning cars with increasing income. It indicates too that the increase in the number of cars resulting from a general increase in income per head is a function, not only of the percentage in each income group owning cars but of the distribution of income and of the relative size of income groups. Thus, if a relatively large income group enjoyed an increase in real income and moved up the scale of car ownership the increase in car ownership would be relatively large also. Finally the percentage ownership column (column 2) suggests that as car ownership spreads, income elasticities of demand are eventually bound to fall, e.g., for an income group of given size, a move from the £200–£399 range to the £400–£599 range would increase their car ownership by 150 per cent., whereas a further shift to the £600–£999 range would increase their car ownership by only 90 per cent. The National Institute, however, find no evidence of a saturation effect in car ownership as income increases on an international comparison.[4]

The above approach, although giving a general indication of the kind of relationships involved in an increase in car ownership, cannot be applied to Ireland because the percentage of each income group owning cars are not known and because a comprehensive and up-to-date distribution of income is not available.

However, an income-distribution for non-agricultural employment has been estimated for 1954[7] and this may be examined for possible indications of the likely growth in car ownership. This income distribution is given in the first two columns of Table 2.

TABLE 2 : ANNUAL INCOME CLASSIFIED BY INCOME RANGES 1954. NON-AGRICULTURAL OCCUPATIONS

| Income range £ (1) | Number of persons with incomes in this range 000's (2) | Number of persons with incomes in and above this range 000's (3) |
|---|---|---|
| Under 300 .. | 381 | 701 |
| 301– 400 .. | 146 | 320 |
| 401– 500 .. | 86 | 174 |
| 501– 600 .. | 32 | 88 |
| 601– 700 .. | 17 | 56 |
| 701– 800 .. | 8 | 39 |
| 801– 900 .. | 7 | 31 |
| 901–1,000 .. | 6 | 24 |
| 1,001–1,100 .. | 4 | 18 |
| 1,101–1,200 .. | 3 | 14 |
| 1,201–1,300 .. | 2 | 11 |
| 1,301–1,400 .. | 2 | 9 |
| 1,401–1,500 .. | 1 | 7 |
| 1,501 and over .. | 6 | 6 |
| Total .. | 701 | |

Now Day[5] has suggested that the growth of car ownership in Great Britain in the 1950's can be "explained" by the number of money incomes above a certain level and he shows a close relationship over the years between the number of incomes over £850 a year and the number of cars in Great Britain.* Using this approach and adapting it to the Irish situation and the data given in Table 2, it may be asked what critical income level would "explain" and account for the ownership of cars outside agriculture in Ireland in 1954. It can be calculated that there were some 77,000 cars in Ireland in 1954 excluding an estimated 40,000 cars on farms, and it can be seen from column 3 of Table 2 which gives decumulative number of incomes above the various levels, that this number of cars is "explained" by the number of incomes above about £525 a year.

Examining column 3 of Table 2 in more detail and moving from the apex of the inverted pyramid, it can be seen that the number of incomes above various levels increases fairly steadily as one moves down the income scale (up the Table) down to a range of £501–£600 a year. After this range, however, the number of incomes above various levels increases rapidly, e.g., there are twice as many incomes above £400 as above £500, and nearly twice as many above £300 as above £400. It is not known how the income distribution has changed since 1954 but even a small general increase in income per head which included these large numbers of incomes in the lower ranges and the resultant

*This does not of course mean that everyone with an income greater than £850 a year will own a car. It merely means that there has been a close correspondence between number of cars and number of incomes above £850 a year, the number of people above this level without cars being compensated for by people below this level with cars.

spreading of car ownership would be sufficient to account for the increase in car ownership of 47,000 to about 124,000 outside agriculture between 1954 and 1960. The large numbers of persons with incomes apparently near the " car-owning margin " therefore suggest that increasing incomes per head will lead to a relatively large increase in car ownership.

We must now turn to consider the ownership of cars in the important agricultural sector which accounted for some 46,000 of the 170,000 cars registered in Ireland in 1960. An income distribution for farms is not available but information on the number of holdings of different sizes and the number of holders owning cars is available and is given in Table 3.[8]

TABLE 3

| Size of holding acres (1) | Number of holdings (2) | Number of holdings on which a car is owned (3) | % of holdings with cars (4) |
|---|---|---|---|
| Less than 5 | 93,117 | 2,648 | 2·8 |
| 5– 10 .. | 24,113 | 972 | 4·0 |
| 10– 15 .. | 23,363 | 929 | 4·0 |
| 15– 30 .. | 73,295 | 4,103 | 5·6 |
| 30– 50 .. | 62,056 | 7,271 | 11·7 |
| 50–100 .. | 54,209 | 14,297 | 26·5 |
| 100–150 .. | 16,417 | 7,545 | 46·0 |
| 150–200 .. | 6,467 | 3,703 | 57·2 |
| 200–300 .. | 4,301 | 2,800 | 65·1 |
| over 300 .. | 2,775 | 1,868 | 67·3 |
| Totals .. | 360,113 | 46,136 | 12·8 |

These data must be interpreted with some care because size of holding is not a firm indication of farm income and because the totals are much influenced by the large number of small holdings, which in many cases are unlikely to be the holder's main source of income. However, the percentage of holdings owning cars increases only slightly with size up to 30 acres and remains below about 5 per cent. After this the percentage of holdings with cars increases rapidly with size up to 200 acres and more, where something like a saturation level is reached with two-thirds of the holdings owning cars.

Overall, only about 13 per cent. of agricultural holdings have cars, but this figure is much influenced by the large number of small holdings, and for holdings of more than 30 acres, 26 per cent. have cars.

Using size of holding as a rough indication of income it seems that increasing prosperity will have a relatively small effect on car ownership on very small holdings because the percentage owning cars is small and remains fairly constant for holdings below 15–30 acres. Above this level, however, car ownership can be expected to expand fairly rapidly with increasing farm income per head.

In the light of the historical growth of the car population and the data contained in Tables 2 and 3 and making allowance for some further technical progress and falling real costs of vehicles and fuels on the one hand, and for falling income elasticities as car ownership spreads on the other, it seems that vehicle ownership at present rates of taxation in the agricultural and non-agricultural sectors combined is likely to grow at least 3 times the rate of growth of income per head over the next 10 years.

Assuming that this prediction is correct and assuming a stable population, the rate of increase in car ownership over the next 10 years will then depend on the growth of income per head and on the distribution of income. Here the future is made somewhat uncertain because of the possibility of greater liberalisation of Ireland's trading relationships and the resultant effects of so doing. This uncertainty is probably best expressed as a range of possible outcomes. If the Irish economy can do no better than it did in the 1950's as a whole, that is an annual rate of increase in real gross national product per head of about 2 per cent. per annum,[9] then car ownership is only likely to increase at a rate of about 6 per cent. per annum, i.e., an increase of about 80 per cent. over 10 years.

However, a higher rate of growth of 3 per cent. to 4 per cent. per annum in gross national product is more realistic since it was achieved in the period 1948–55 and has been exceeded since 1958.[9] This implies an annual rate of increase of 9–12 per cent. in cars and suggests a rate of 10 per cent. which was in fact attained from 1959–60, from 1960–61 and from 1961–62.[10]

In addition to growth in income per head, changes in the distribution of income within the economy could have considerable effects on car ownership. In particular the distribution of income between the agricultural and industrial sector could be of considerable importance because owing to the relative dearth of public transport in rural areas a re-distribution of income in favour of agriculture is likely to increase car ownership overall. In this connection it should be noted that insofar as greater liberalisation on a reciprocal basis is likely to benefit the agricultural sector more than the industrial sector, the rate of increase in car ownership may be accelerated, particularly in rural areas and particularly in the counties to the west where car ownership is low and is increasing most rapidly.[1] As against this must be set the fact, that an increasingly productive agriculture is likely to result in a falling farm population.

On the whole a rate of increase in car ownership of about 10 per cent. per annum seems to be the

most likely outcome for the 1960's with the number of cars increasing to about 2.6 times their 1961 level over the 10 year period. This estimate of about 480,000 cars in 1971, however, may be approaching the absolute number of persons likely to own cars, since in the 1951 census there were some 450,000 married couples, 55,000 widowers, and 300,000 single males aged 20–44, a total of some 800,000.[9]

Motor-cycle ownership is of much less importance than car ownership accounting for only about 10 per cent. of the vehicle mileage carried out by cars in 1960. Most of the 45,600 motor-cycles registered in 1961 are small, e.g., about half are 75 c.c. cylinder capacity or less and almost 80 per cent. are of 150 c.c. capacity or less.[10] Their rate of increase during the 1950's was very rapid, annual rates of increase of 40 per cent. being recorded during the 1950's, falling, however, to an increase of only about 10 per cent. between 1960 and 1961.[10] It is recognised too, that being an "inferior good", the ownership of motor-cycles is not income elastic. Thus the study of the ownership of durable goods in Britain in 1952[6] gives the percentage of the various income groups owning motor-cycles in 1952, as compared with the percentage owning cars.

TABLE 4: OWNERSHIP OF MOTOR-CYCLES IN GREAT BRITAIN 1952

| Income Group £ (1) | % owning motor-cycles (2) | % owning cars (3) |
|---|---|---|
| Under 200 .. | 0 | 1 |
| 200– 399 .. | 4 | 4 |
| 400– 599 .. | 4 | 10 |
| 600– 999 .. | 7 | 19 |
| 1,000–1,999 .. | 4 | 44 |
| 2,000 and over .. | 3 | 76 |

For various reasons, therefore, one would not expect the rates of increase in motor-cycles in the early 1950's, which were probably associated with the emergence of the smaller machine, to be continued into the future. It is more likely that more recent rates of increase of about 10 per cent. per annum will be sustained, equivalent to an increase to 2.6 times the present level in 10 years.

## The Growth of Public Passenger Transport

Public road passenger transport has increased much more slowly than private passenger transport in recent years, the number of buses registered having increased by 19 per cent. between 1951 and 1961, e.g., from 1,229 to 1,466. Between 1952 and 1960 (trends before 1952 being distorted by large increases in fares) vehicle mileage and passenger mileage by bus rose by 13 per cent. and 22 per cent. respectively,[1] i.e., increases in vehicle mileage and passenger mileage of $1\frac{1}{2}$ per cent. and $2\frac{1}{2}$ per cent. per annum respectively.

Normally, one would expect to project something like these rates of increase in order to estimate future trends but public and private passenger transport are such close substitutes and private transport is so expansionary that it would be obviously unwise to do this.

The growth of private transport in practice means heavy substitution against public transport (particularly bus transport) by those acquiring private transport, and although a greater amount of travel by those not acquiring private transport may be sufficient to offset this and to sustain public transport, this will not necessarily be the case.* Thus, in Great Britain the passenger mileage carried by buses owned by the British Transport Commission, in London and the provinces has declined from about 19,500 million in the period 1951–54 to 16,179 million in 1960 a decline of about 15 per cent.[11] At the same time rail passenger mileage remained virtually constant but private car registrations increased from 2,380,000 in 1951

*In a highly formal and simplified way, it can be shown that if families owning cars do not travel by bus, then bus travel will reach a maximum and then decline when the proportion of families owning cars equals $\frac{rb}{rc+rb}$ where $rb$=annual rate of increase in bus travel by families not owning cars, $rc$=annual rate of increase in car ownership. Current rates of increase given above suggest that this maximum will be reached when $\frac{1}{3}$ of families own cars, although since families owning cars *do* travel by bus the critical level of car ownership must be higher than this.

TABLE 5: PASSENGER MILEAGE BY BUS 1952 AND 1960
(cross border services excluded)

| | 1952 | | | 1960 | | |
|---|---|---|---|---|---|---|
| | Passenger mileage millions (1) | Vehicle mileage millions (2) | Occupancy persons (3) | Passenger mileage millions (4) | Vehicle mileage millions (5) | Occupancy persons (6) |
| City and suburban services .. .. | 449 | 27·6 | 16·3 | 621 | 33·0 | 18·8 |
| Other internal services .. | 191 | 15·7 | 12·2 | 164 | 16·0 | 10·2 |

to 5,237,000 in 1960, an increase of 120 per cent.[12] This stage of decline in road passenger transport has not yet been reached in Ireland where income per head, car ownership per head, and the percentage increase in cars have only been about half the British level, but trends in Ireland between 1953 and 1961 are estimated in detail in Table 5.[13] It may be seen from Table 5 that there has been a considerable increase in passenger mileage on city services over the years, and a considerable increase in the occupancy of city buses from an average of 16.3 to 18.8 passengers per bus.

In the provincial services, however, a contrary trend is noticeable for in spite of increased vehicle mileage and increased provision of bus services, there has been a considerable decline in passenger mileage by bus and a considerable decline in occupancy from an average of 12.2 in 1952 to 10.2 in 1960.

It thus appears that the main competitive effect resulting from the growth of the private car and the motor-cycle is on rural bus services and in a sense this is to be expected because the thinner the population the more difficult it is to run bus services at reasonable frequencies and at reasonable occupancies and thus with reasonable fares, and the greater the incentive to acquire private transport. In fact the competitive effect and dangers of the growth of private passenger transport on public passenger transport is understated by a direct comparison, because the growth of private transport will mean falling occupancies, which (in the absence of subsidies) must normally be met by raising fares or reducing frequency of service, which will encourage a further transfer to private transport.

The relationship between public transport with its economies of scale outlined above, and private transport, seems to be inherently unstable, and the dangers of a cumulative transfer from public to private transport in rural areas, leaving them with even less public transport than they already possess, seem to be very real.

The problems of operating rural bus services are fairly general and even in Britain with its denser rural population, higher occupancies (19 per bus in 1960) and lower fares (1.47 pence per passenger mile compared with the Irish provincial figure of 2.83 pence in 1960) considerable difficulties and operating losses have been incurred by provincial and Scottish bus services in recent years, even though passenger mileage has only declined by about 5 per cent. between 1951 and 1960.[11]

On the whole the prospects for city bus services seem reasonably good within the next 10 years, in that general growth of demand seems likely to offset the transfer from public to private transport and growing urban congestion and lack of parking space will tend to operate in their favour. Without subsidies, however, the prospects for rural bus services, with the spread of private transport in rural areas, is one of continuing decline, although social and political pressures may strongly oppose this. To a considerable extent, however, this decline might be met by introducing the one man bus, for with an average occupancy of 10 persons and an average journey length of 7.7 miles,[12] one man operation should be technically possible on a wide scale and can be calculated to give savings in vehicle operating costs of up to 15 per cent.[13] A saving of this order, applied to the reduction of fares, might stimulate a cumulative process of falling fares, rising occupancies, etc., and help to arrest possible decline in rural bus transport.

## The Growth of Road Goods Transport

Concerning the growth in the number of goods vehicles registered in recent years from 1951 onwards, it appears that there have been two phases of growth, the first being a fairly rapid increase from 26,700 vehicles in 1951 to 43,200 vehicles in 1957,[1] a rate of increase of 8.4 per cent. per annum. Between 1957 and 1961 the number of commercial vehicles registered has remained virtually constant at between 43,000 and 44,000,[1] (though rising to 44,750 in 1962) but during this period there have been considerable changes in the composition of commercial vehicles as may be seen from Table 6.

TABLE 6: COMMERCIAL GOODS VEHICLES LICENSED IN AUGUST 1956 AND 1961
(electrically propelled vehicles excluded)

| Unladen weight | August 1956 (1) | % of total (2) | August 1961 (3) | % of total (4) |
|---|---|---|---|---|
| Less than 12 cwts. | 7,373 | 17·7 | 1,369 | 3·1 |
| 12–16 cwts... .. | 4,516 | 10·9 | 11,531 | 26·5 |
| 16–20 cwts. .. | 14,520 | 34·9 | 12,333 | 28·4 |
| 1– 2 tons .. .. | 3,437 | 8·3 | 5,750 | 13·2 |
| Total not exceeding 2 tons .. .. | 29,846 | 71·8 | 30,983 | 71·2 |
| 2–3 tons .. .. | 8,293 | 19·9 | 4,472 | 10·4 |
| 3–4 tons .. .. | 2,364 | 5·7 | 4,958 | 11·4 |
| 4–5 tons .. .. | 602 | 1·4 | 1,729 | 4·0 |
| 5–6 tons .. .. | 239 | 0·6 | 654 | 1·5 |
| 6–7 tons .. .. | 69 | 0·2 | 197 | 0·5 |
| 7–8 tons .. .. | 65 | 0·2 | 158 | 0·4 |
| 8–9 tons .. .. | 91 | 0·2 | 140 | 0·3 |
| Over 9 tons .. | 28 | 0·1 | 143 | 0·3 |
| Total over 2 tons .. | 11,751 | 28·2 | 12,451 | 28·8 |
| Grand totals .. | 41,597 | 100·0 | 43,434 | 100·0 |

*Source :* Department of Local Government.

The table divides commercial vehicles into those under 2 tons unladen weight which are mainly

occupied in collection and delivery work and which account for some 70 per cent. of commercial vehicles, and those over 2 tons unladen weight which are more likely to be used on trunk haulage. The table shows that although there has been little change in the numbers, importance and average weight of the group under 2 tons, and little change in numbers in the group over 2 tons, there has been a significant increase in the weights of the heavier vehicles. Thus, there was an increase in the average unladen weight of this group of vehicles from 3.0 tons in 1956 to 3.63 tons in 1961 and in view of the relationship between unladen weight and carrying capacity an even greater proportionate increase in their carrying capacity. This failure of the number of commercial vehicles to increase in the late fifties is probably associated with the stagnation of industrial production which only regained its 1955 level in 1959[9] and of agricultural output, although the failure of the number of commercial vehicles to increase between 1959 and 1961 is surprising in view of the increase in production of transportable goods in those years.

In view of the failure of the commercial vehicle fleet to expand numerically with industrial production in recent years and in view of increasing carrying capacities per vehicle, it seems unlikely that the number of commercial vehicles will expand at the same rate as gross national product. Assuming an increase in gross national product of 3 per cent.—4 per cent. per annum with a constant population, the number of commercial vehicles might be expected to increase by about 2 per cent. per annum, suggesting an increase in their numbers of about 20 per cent. in 10 years. To some extent, however, the number of commercial vehicles will be influenced by the future situation concerning the licensing and freedom of vehicles (and to a lesser extent by the future of the railways). This question of freedom of operation of commercial vehicles is considered below.

## The General Growth in Road Vehicles and Traffic

It is necessary to summarise the above predictions for the individual classes of vehicle and to translate them into a predicted increase in the total number of vehicles and a predicted general increase in traffic. The individual predicted increases in the number of vehicles are summarised in Table 7.

Applying the data in Table 7 to the 1961 population of vehicles which totals some 327,000, an increase to about 680,000 vehicles is suggested in 10 years' time, some 110 per cent. above the 1961 level. This is equivalent to an annual rate of increase in the number of vehicles of 7.5 per cent. per annum.

TABLE 7: PREDICTED INCREASE in NUMBER of ROAD VEHICLES over next 10 YEARS

| Class of vehicle (1) | Predicted annual rate of increase % (2) | Expected number in 10 years' time as ratio of present number (3) |
|---|---|---|
| Private cars .. .. | 10 | 2·6 |
| Motor-cycles .. | 10 | 2·6 |
| Buses .. .. | 0–1 | 1·0–1·1 |
| Commercial vehicles and tractors .. | 2 | 1·2 |

Relating the increase in Table 7 to estimated total vehicle mileage in 1960 of 2,925 million as given in a previous paper,[1] on the assumption that average vehicle mileage remains the same for each class of vehicle, total vehicle mileage could be expected to increase to 6,500 million in 10 years. These estimates are equivalent to an increase of about 112 per cent. above 1960 levels, equivalent to an annual rate of increase of 7.8 per cent.

However, there is general evidence that as motor vehicle ownership increases, mileage per vehicle tends to fall. For Ireland the fact that although the number of vehicles licensed increased by 94 per cent. between 1951–52 and 1960–61, total fuel consumption in 1960–61 was only 31 per cent. above the 1951–52 level[1] points to the same conclusion, even though increasing fuel economy has probably accounted partly for this. Very approximately, therefore, the prospect is for a rise of 100 per cent. in road traffic in the next 10 years equivalent to an annual rate of increase of about 7.2 per cent.

# ROAD TRANSPORT FACILITIES FROM THE VIEWPOINT OF THE USER

## The Licensing and Freedom of Commercial Vehicles

Restrictions on the use of commercial vehicles employed on transport for reward date back to the 1933 Road Transport Act which was aimed at protecting the railways from competition and to enable them to secure a substantial share in road transport for hire and reward.[14] The latter aim, however, has only been partly fulfilled. The Act prohibited, save under licence, the carriage of goods for reward by mechanically propelled vehicles except within certain exempted areas which, since 1944, have been within a radius of 15 miles from Dublin and Cork and within a 10 mile radius of Limerick, Waterford and Galway. Licences were granted to existing hauliers in 1933 (and in 1944 when certain areas were removed from exemption) on the basis of their original vehicle fleets with certain restrictions as to the weight of the vehicle operated, the radius of operation, and on the

TABLE 8: OPERATIONS OF LICENSED HAULIERS 1960

| Category of operator (1) | Number of concerns (2) | Number of vehicles (3) | Tonnage carried 000's (4) | Livestock carried 000's (5) | Vehicle miles run 000's (6) |
|---|---|---|---|---|---|
| Rail companies (including rail-head collection and delivery) | 3 | 879 | 3,327 | 323 | 15,163 |
| Other operators .. .. | 890 | 1,090 | 2,257* | 867 | 20,980 |
| | 893 | 1,969 | 5,584 | 1,190 | 36,143 |

*Estimate based on tonnages per vehicle carried by larger operators.

commodities carried. Licences could be transferred or continued by near relatives of the original licensee provided that he lived in the same district but virtually no new licences have been granted to new entrants other than some issued for special traffics, e.g., turf, milk and cream, newspapers, on the grounds of inadequacy of transport.

Under the same Act the railway companies were empowered to buy either by compulsion or by agreement, the licenses and businesses of their competitors, which they have done on a substantial scale, having acquired some 387 of their larger competitors.[14]

Commercial road goods transport in Ireland, therefore, consists of several sectors. On the one hand, there is private transport which consists of traders and firms carrying their own goods in their own vehicles which they are freely allowed to do, and on the other hand, transport for hire and reward. Commercial transport for hire and reward may be divided into two sectors, those vehicles operating within the exempted areas (Dublin, Cork, Limerick, Waterford and Galway) and the licensed hauliers which include the railway companies. Details of the operations of the licensed hauliers[15] are given in Table 8.

It is evident from Table 8 that apart from the rail companies which are virtually a single operator most of the licensed hauliers are one vehicle concerns, since the average number of vehicles is only 1.2 per concern, and even for the larger licensed hauliers (not shown separately in the table) the 23 concerns own only 89 vehicles. Although tonnage and livestock carried and vehicle miles run are misleading guides to total transport activity it seems that the rail companies (C.I.E.) account for just under half the total transport activities of licensed hauliers.

In addition to the licensed hauliers there are the vehicles operating only within the exempted areas which totalled some 2,190 vehicles in 1960,[10] so that in the reward sector of public transport about equal numbers of vehicles are operated by licensed hauliers and hauliers in the exempted areas. The weight distribution of all commercial vehicles operated for reward (licensed hauliers and hauliers operating in the exempted areas) is given in Table 9 for 1960[10] and compared with the weight distribution of all commercial vehicles.

TABLE 9: WEIGHT DISTRIBUTION OF COMMERCIAL VEHICLES 1960 (excluding electrically propelled vehicles)

| Unladen weight (1) | Number of vehicles licensed for operation for reward (2) | Total number of vehicles (3) | % of total (4) |
|---|---|---|---|
| Less than 2 tons .. | 952 | 31,627 | 3·0 |
| 2–3 tons .. | 1,501 | 5,078 | 29·5 |
| 3–4 tons .. | 916 | 4,246 | 21·5 |
| 4–5 tons .. | 307 | 1,154 | 27·0 |
| 5–6 tons .. | 251 | 504 | 50·0 |
| Over 6 tons .. | 233 | 542 | 43·0 |
| Totals .. | 4,160 | 43,151 | 9·7 |

Although vehicles registered for operation for reward are only about 10 per cent. of the total of commercial vehicles, they account for substantial proportions of the heavier vehicles over 2 tons unladen weight and in a previous paper[1] it was estimated that they accounted for roughly 28 per cent. of total ton-mileage carried by road in 1960.

The restriction on the numbers of vehicles in the reward sector is shown by the fact that the number of vehicles operated by carriers had declined from 4,786 in 1950 of which 3,428 were over 2 tons unladen weight[14] to the 4,160 given in Table 9 in 1960 of which 3,208 were over 2 tons unladen weight. However, by 1962 the number of vehicles operated for reward had risen sharply to 5,149 of which 3,950 were over 2 tons unladen weight. At the same time, vehicles registered for transport of own goods have increased from 19,758 in 1950[14] (of which 5,358 were over 2 tons) to 38,991 in 1960 (of which 8,316 were over 2 tons unladen weight) to 39,601 in 1962, of which 9,761 were over 2 tons.[10]

Having outlined the conditions under which transport for hire operates and the size of that sector the question arises as to how far the present

controls and restrictions are justified, since the original situation that these restrictions were intended to remedy some 30 years ago has changed considerably. For example, when these restrictions were introduced in 1933 railway charges were controlled at rates based on the value of commodities carried and the railways were particularly vulnerable to road competition, whereas the railways now have freedom to vary their charges in accordance with the competitiveness of the market. The criterion for an economically efficient system of transport may be broadly defined as the satisfaction of users' demands at minimum total costs. However, since users' demands for convenience, etc., may be extremely complex, these two requirements are often conflicting and it is necessary to specify some freedom of choice by the user as a criterion of economic efficiency,[16] since only he can be aware of the subjective costs and conveniences in his choice between different forms of transport, leaving him to choose the combination of cost and convenience which satisfies him best. If his choice is restricted by controls on the supply of different forms of transport, however, there is a prima facie case for assuming some loss of economic efficiency, which must be justified on other grounds, e.g., lower costs arising from higher load factors, more frequent services at a given cost, or complementarity between services, which might be obtainable by monopolistic restrictions rather than by "wasteful" competition.

Economies of scale on the supply side, e.g., higher load factors, may arise from reserving a large part of goods transport for hire to one organisation, C.I.E., and this may have certain organisational advantages in that road and rail services can be organised complementarily, and, if rail transport is likely to decline and road to expand or vice versa a relatively painless internal change may be arranged. However, these economies of scale if obtained seem to be at the expense of a large number of one vehicle businesses in the remainder of the licensed haulage sector, and the result may be well away from the optimum size distribution of firms, e.g., one firm with about 900 vehicles and 900 firms with 1,100 vehicles, seems a strange distribution. Again, restrictions in radii of operation in a pattern occurring in 1933 both on licensed hauliers and on hauliers operating within the exempted areas must tend to give poor utilisation of vehicles.

Turning to the choice of users and the availability of transport to them, it must be pointed out that Ireland as an agricultural country has a large number of small businesses whose operations in many cases would not justify the acquisition of private transport for their own goods and they must rely on transport provided for reward to a considerable extent. Although C.I.E. is considerably decentralised, the population is widely scattered, telephones are scarce,* and the demands of the user might be better met by more personal contact with a larger number of hauliers able to carry for reward. Finally, although C.I.E. is free to expand its vehicle fleet, the restrictions on other hauliers for reward will tend to reduce the total size of the haulage sector for hire and reward, hinder cooperation in transport between firms and between farmers, and increase the amount of private commercial transport of business's own goods with difficulties in securing good loadings, particularly return loads. This may raise costs of transport above what they would have been with a larger sector for hire or reward, without necessarily obtaining compensating advantages in convenience, etc.

In many other countries it is common to restrict the operations of commercial vehicles in a wide variety of ways, and in particular in Great Britain a similar set of restrictions to those in Ireland were established at about the same time (1932) and for much the same principal reasons, to protect the railways with their vulnerable price structure from competition, and to secure "order" in road transport for hire and reward, e.g., protection from price-cutting by new entrants. Similarly the British Transport Commission established in 1948 and encompassing the railways, and certain road services and buses is broadly parallel with C.I.E. The British system is less monopolistic and restrictive, however, for of the total number of vehicles licensed for hire or reward (A and B licences) the Transport Commission (British Railways and British Road Services) accounted for 16 per cent.[17] in 1959 as compared with 21 per cent. for C.I.E. and the number of vehicles licensed for hire or reward (A and B licences) other than Transport Commission vehicles increased from about 120,000 in 1950 to about 164,000 in 1959,[17] whereas in Ireland over the same period the number of vehicles licensed for reward actually declined. In spite of this comparative liberality, however, there has been growing criticism and questioning of the British licensing system which has been echoed by the licensees themselves who had until recently supported the system for the protection from competition and from rate cutting it had given them.

On the whole, therefore, a review of the whole existing sytem of licensing vehicles for hire and reward seems to be required with particular emphasis on the extent to which the legitimate demands of the transport user are satisfied by the present system. Although this review would raise

*In 1960 there were only 53 telephones per 1,000 population in Ireland[9] as compared with 154 per 1,000 population in Great Britain.[17]

wide and fundamental issues, it seems that the present set of restrictions may raise transport costs unduly or result in lower provision of transport than a more liberal and more competitive system, and may thus retard economic development.

It should, perhaps, be noted that, the Committee of Inquiry into Internal Transport in 1957 opposed relaxation of the restrictions applied to carriage for reward. Its grounds for doing this, however, were the critical position of the principal public transport undertakings at that time, which was the reason for the Committee's existence, and in compensation to the hauliers themselves, the protection from competition afforded by the restrictions of entry into the industry. The case for the review of the licensing system, however, arises from consideration for the interests of transport users which ultimately must be regarded as paramount above the interests of existing transport organisations.

Concerning commercial vehicles in general a further subject for comment is the taxation imposed on commercial vehicles, i.e., the vehicle licence duties mentioned in a previous paper.[1] These are given in Table 10.

TABLE 10: ANNUAL VEHICLE LICENCE DUTIES PAYABLE by COMMERCIAL VEHICLES 1962

| Unladen weight | Annual duty* £ |
|---|---|
| Less than 1 cwt. | 15 |
| 12–16 cwt. .. | 20 |
| 16 cwt.–1 ton .. | 24 |
| 1–2 tons .. | 30+ 4 per quarter ton |
| 2–3 tons .. | 46+ 6 „ „ „ |
| 3–4 tons .. | 70+ 8 „ „ „ |
| 4–5 tons .. | 102+10 „ „ „ |
| 5–6 tons .. | 145+15 „ „ „ |
| 6–7 tons .. | 205+20 „ „ „ |
| 7–8 tons .. | 285+25 „ „ „ |
| 8–9 tons .. | 385+30 „ „ „ |
| More than 9 tons | 505+50 „ „ „ over 9 tons |

*Source :* Finance Act 1952.

*Purely for purposes of comparison the British annual duty starts at £12 for a goods vehicle of less than 12 cwt. unladen weight plus £0·6 per cwt. unladen weight up to 3 tons, plus £0·9 per cwt. up to 4 tons, plus £1·2 per cwt. thereafter.[18] Thus a vehicle of 10 tons unladen weight in Britain pays £204 in annual licence duty as compared with £705 in Ireland.

It can be seen that as compared with other classes of vehicle which have licence duties made up by a constant plus a constant rate of duty per h.p. or c.c. or per seat,[1] the increment in commercial vehicle duty increases at an increasing rate with vehicle weight. Thus from £1 per additional cwt. at unladen weights of 1 ton or less and £0.8 per additional cwt. between 1 and 2 tons the incremental rate rises to £10 per additional cwt. at unladen weights of 9 tons or more. This duty imposes a considerable burden on the heavier commercial vehicles for it may be calculated from Tables 6 and 10 that the total duty payable by the 12,450 vehicles over 2 tons unladen weight in 1961 was £1,163,000 or about £93 per vehicle. Thus vehicles over 2 tons which constituted about 3 per cent. of the total number of road vehicles accounted for about 18 per cent. of vehicle licence duties.

Although the factors determining road and vehicle taxation must be a complex amalgam of specific transport factors, e.g., wear on road surfaces, congestion caused, etc., and budgetary and balance of payments considerations, it is difficult to see the justification for this steep discrimination against the heavier commercial vehicle. Thus information supplied by the Road Research Laboratory in Britain suggests that for a given number of applications, road wear increases with the square root of wheel load. Assuming a constant number of wheels for each weight of vehicle, road wear will then increase by the square root of total *laden* vehicle weight, i.e., a doubling in *laden* vehicle weight will only increase road wear by 42 per cent. Although laden vehicle weights rise rapidly with increase in unladen weights, there is no evidence that road wear per application will rise as rapidly with unladen weight as the taxation rates in Table 10. This is a very complex subject, however.

The rates of duty on the heavier commercial vehicles, which carry the bulk of total ton-mileage by inland transport,[1] seem to discriminate against road and in favour of rail and against the heavier commercial vehicles. This will tend to influence road transport towards the lighter commercial vehicle with higher real costs per ton-mile, and inhibit road transport with apparently no evidence that this is desirable for the economic efficiency of the transport system.

Some review of vehicle licence duties on commercial vehicles over 2 tons unladen weight, at the same time as a review of commercial transport for payment or reward seems to be required therefore.

## Road Passenger Transport

At first sight, much the same kind of situation concerning passenger transport for reward seems to exist as for goods transport for reward in that the 1932 Road Transport Act restricted freedom of entry into the industry, and together with the 1927 Railways (Road Motor Services) Act, enabled rail companies to acquire road passenger undertakings,[14] so that at present C.I.E. (including passenger services acquired with the Great Northern Railway) has an almost complete monopoly of road passenger transport in the State.*

*Thus in 1960 there were 113 continuous road passenger licences granted to other concerns which in 1954 were estimated to carry about 1 per cent. of total road passengers only.[14]

However, given the size of vehicle to be operated, and the low density of population, particularly in the rural areas, there are very considerable advantages in monopolistic integration of regular services in securing complementarity in services and higher occupancies (or load factors) and a review of this situation does not seem to be as pressing as for goods transport for reward.

The lack of public transport in the rural areas, which arises fundamentally from the low density of population, must nevertheless remain a matter of some concern. Excluding cross-border services and city and suburban services it has been shown above (Table 5) that some 16 million vehicle miles and 164 million passenger miles of largely rural bus services were carried out in 1960.

In 1961, however, the population outside the cities and their suburbs was 1,943,000[9] so that on average the rural dweller only carried out some 90 miles of bus travel per year as compared with over 700 passenger miles per city dweller. This comparative lack of passenger transport has not been met generally by higher car ownership, for outside the cities and their suburbs car ownership was at a rate of about 62 per 1,000 population as compared with 70 per 1,000 for the cities in 1961. Although eastern counties tend to have high rates of car ownership, the deficiency in car ownership is especially pronounced in the western counties of Mayo, Roscommon, Galway, Clare, Sligo, Kerry and Donegal, even though ownership is increasing comparatively rapidly in these counties.[1]

As a remedy for the current difficulties of rural passenger transport, the one man bus has been suggested above, although it may be desirable to go further than this and to consider the more frequent operation of the smaller bus of about 12 seats (as compared with an average of 39 seats for a single deck bus) either by C.I.E., or more doubtfully, by freer licensing of would be entrants. Such minibuses might give savings in total operating costs of up to 40 per cent. over double-manned single deck buses[13] although their restricted capacity will give certain operating disadvantages.

The case for the minibus in sparsely populated areas has been considered and rejected recently in Britain, although the grounds for rejection do not appear very strong and conclusive and further examination of the case for this kind of vehicle seems desirable in the Irish context.

## THE ADJUSTMENT AND EXPANSION OF THE ROAD SYSTEM TO ACCOMMODATE INCREASING TRAFFIC VOLUMES

There is little comprehensive information on traffic volumes, road widths, etc., for particular stretches of road in Ireland and such information is laborious and difficult to obtain.

Therefore, it is necessary to fall back mainly on a global statistical approach to the question of the distribution of traffic over the road system and the adequacy of the road system to accommodate it.

It has been estimated in a previous paper[1] that total traffic volume in Ireland in 1960 was some 2,925 million vehicle miles made up as follows.

| Type of vehicle | Vehicle miles millions |
|---|---|
| Private cars .. .. | 2,000 |
| Motor-cycles .. .. | 200 |
| Commercial vehicles .. | 675 |
| Buses .. .. .. | 50 |
| | 2,925 |

Distributed evenly over the road system of some 51,000 miles, this suggests a mean traffic flow of about 160 vehicles a day. However, traffic is likely to be very unevenly distributed over the road system. In the first place, the number of vehicles licensed are heavily concentrated in a few city and urban areas. Thus Dublin County and County Borough had 28.1 per cent. of the total vehicles licensed in Ireland, in 1960 and Cork, Limerick and Waterford County Boroughs had a further 4.5 per cent. of total vehicles licensed.[10] Assuming national average vehicle mileage for each class of vehicle in these areas the total vehicle mileage attributable to the vehicles licensed in the County Boroughs and in County Dublin are as follows :—

TABLE 11: NUMBER OF VEHICLES LICENSED IN URBAN AREAS 1960

| Area | Number of vehicles licensed | % of total number of vehicles | Estimated annual vehicle mileage* 000's | % of total vehicle mileage |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| Dublin County Borough and County .. | 85,297 | 28·1 | 877,680 | 30·6 |
| Cork, Limerick and Waterford County Boroughs .. | 13,788 | 4·5 | 155,438 | 5·3 |
| | 99,085 | 32·6 | 1,033,118 | 35·9 |

*Assuming the Irish average annual utilisation of 11,500 miles for cars and taxis, 15,500 miles for commercial vehicles, and 4,800 miles for motor-cycles, with bus vehicle mileages as actually recorded for Dublin City Services and Other City Services respectively.

It appears, therefore, that about one third of the total number of vehicles are accounted for by the County Boroughs including County Dublin, and that assuming average vehicle utilisation, that the vehicles registered in the County Boroughs and County Dublin account for slightly more than a third of total vehicle mileage.

However, the questions then arise as to how far urban vehicles can be assumed to have average utilisations in terms of vehicle mileage and how far their total annual vehicle mileages can be assumed to be allocated to urban roads. On the whole, one would expect urban vehicle utilisation to be lower than the average, because destinations tend to be nearer and concerning the allocation of vehicle mileage by urban vehicles to urban roads it does not seem an unreasonable assumption that the rural vehicle mileage by " town " based vehicles will be compensated by urban vehicle mileage by "country" based vehicles. In effect, therefore, it does not seem unreasonable to allocate all vehicle mileage by urban based vehicles to urban roads, and all vehicle mileage by country based vehicle to rural roads ; the validity of this assumption seems to be confirmed by a study of the distribution of traffic over the road system in Britain.[19] Thus it may be assumed that approximately 925 million vehicle miles, 31.7 per cent. of the total, are carried out in the County Boroughs including County Dublin and 2,000 million vehicle miles, 68.3 per cent. of the total, are carried out on the remainder of the road system.

This division splits the allocation of traffic into two, first an urban allocation consisting of 790 million vehicle miles on about 1,350 miles of road in Dublin (County Borough and County) and 135 million vehicle miles on about 200 miles of roads in the County Boroughs of Cork, Limerick and Waterford. This gives a mean traffic volume of about 1,600 vehicles per day in Dublin (County Borough and County) and 1,850 vehicles per day in the other county boroughs, giving rise to possible urban traffic problems which will be considered in detail later. Second, there is a largely rural allocation of 2,000 million vehicle miles to about 50,000 miles of road an average volume of about 110 vehicles per day. The rural distribution of traffic is likely to be very uneven, however, and must be considered in greater detail.

## Rural Traffic Volumes and the Rural Road System

It is in the nature of any transport system that traffic is very unevenly distributed over the system. Thus it has been shown from the sample survey of traffic in Britain[19] that 16 per cent. of traffic was carried on the busiest 1 per cent. of the road system, 45 per cent. on the busiest 5 per cent., 62 per cent. on the busiest 10 per cent. and 95 per cent. on the busiest 50 per cent. of road mileage. Although this distribution covers both urban and rural traffic its concentration is little greater than that in rural areas alone, and it can thus be applied to rural traffic volumes.

Applying this distribution to Irish rural vehicle mileage and the Irish rural road system we have the following possible distribution.

TABLE 12: POSSIBLE DISTRIBUTION OF TRAFFIC OVER IRISH RURAL ROAD SYSTEM 1960

| Road mileage (1) | Estimated annual vehicle mileage on these roads millions (2) | Estimated average traffic volume | |
|---|---|---|---|
| | | Vehicles per day (3)=(2)÷(1)×365 | Vehicles per hour* (4)=(3)÷16 |
| 500 | 320 | 1,755 | 110 |
| 2,000 | 580 | 800 | 50 |
| 2,500 | 340 | 375 | 24 |
| 20,000 | 660 | 90 | 6 |
| 25,000 | 100 | 11 | 1 |
| 50,000 | 2,000 | | |

*Calculated by dividing daily traffic by 16 or by taking 6¼ per cent. of daily traffic, i.e. it is assumed that all traffic passes within 16 hours of the day and that the resultant average hourly volume is representative of all hourly traffic volumes. This is considered to be more representative of traffic volume for the purposes of adjusting road width, etc. than the 30th highest traffic volume in the year (widely used in the U.S.A. and elsewhere) which is about twice as high.[20]

These data are presented as a smoothed curve for 1960 in the diagram together with a curve for 1970 on the assumption that traffic will double over the decade whilst retaining the same distribution. In figure 1 these curves are compared with Irish standards of road width which are as follows[21]:—

TABLE 13

| Class of road | Traffic volume vehicles per hour | Recommended road width |
|---|---|---|
| 1 | over 400 | 2×24 ft. dual carriageway |
| 2 | 100–400 | 24 ft. carriageway |
| 3 | 25–100 | 20 ft. ,, |
| 4 | 0– 25 | 18 ft. ,, |

Accepting these standards as sound for the moment in the sense that their (marginal) costs can be justified by the (marginal) gains to traffic,* by

*It is virtually impossible to justify or to criticise these standards because the data by which they might be appraised is not known. That is, no up-to-date or relevant information on the effect of road width on speed seems to exist and there is no information that would determine the value of savings in time of vehicles and their occupants at all accurately. Both, of course, are complex and controversial subjects.

these standards and on the possible traffic distribution for 1960 and 1970, the lengths of rural road required at different standards of width, derived from Figure 1, are as given in Table 14.

TABLE 14; APPROXIMATE LENGTHS of ROAD REQUIRED at DIFFERENT STANDARD WIDTHS

| Standard | Width | Lengths of rural road required at these widths, miles | | Possible investment required 1960–1970 £ million |
|---|---|---|---|---|
| | | 1960 | 1970 | |
| Class 1 .. | 2×24 ft. | 0 | 0 | 0 |
| Class 2 .. | 24 ft. | 250 | 1,500 | 20 |
| Class 3 .. | 20 ft. | 3,500 | 7,250 | 30 |
| Class 4 .. | 18 ft. | 46,250 | 41,250 | |
| | | 50,000 | 50,000 | 50 |

It appears from these possible distributions that the lowest standard (18 ft.) would suffice for about 46,000 miles of road in 1960 and about 41,000 miles of road in 1970. The estimates in Table 14 may be translated into possible investment requirements over the 10 year period on the assumption that the present rural road system conforms to the requirements of 1960.

Assuming an average cost of road widening of £0.75 per sq. ft. added to the carriageway, some ¾ of that estimated for Britain in 1958,[22] an investment of some £50 million would be required over the 10 year period.

It must now be considered whether a British distribution of traffic is applicable to Ireland. On the whole, the Irish population is much less heavily concentrated than the British; 42 per cent. of the Irish population living in towns over 3,000 population in 1961[9] as compared with almost 80 per cent. of the British population in urban districts in 1960.[17] Traffic is likely to be more evenly distributed over the rural road system in Ireland, therefore, and the true curves for Figure 1 will probably be considerably flatter than those drawn. This flattening will affect the investment required during the period 1960–70 somewhat indeterminately by decreasing the mileages of road required at the higher standard (Class 2) but increasing the mileage of road to be raised from the lowest standard to Class 3.

Thus very roughly and tentatively rural investment requirements for increasing road width to accommodate a doubling of traffic within the decade may be put at about £50 million.

It remains to consider the rural road requirements in particular the alignment (straightness) and sight distances of the road system, and the need (if any) for by-passes to small towns and villages.

Although various standards of alignment and sight distance are laid down for Irish roads[21] no survey of road alignment and sight distance has been carried out, nor is it possible to carry out for road alignment the kind of simple global statistical approach outlined above. Also re-alignment and

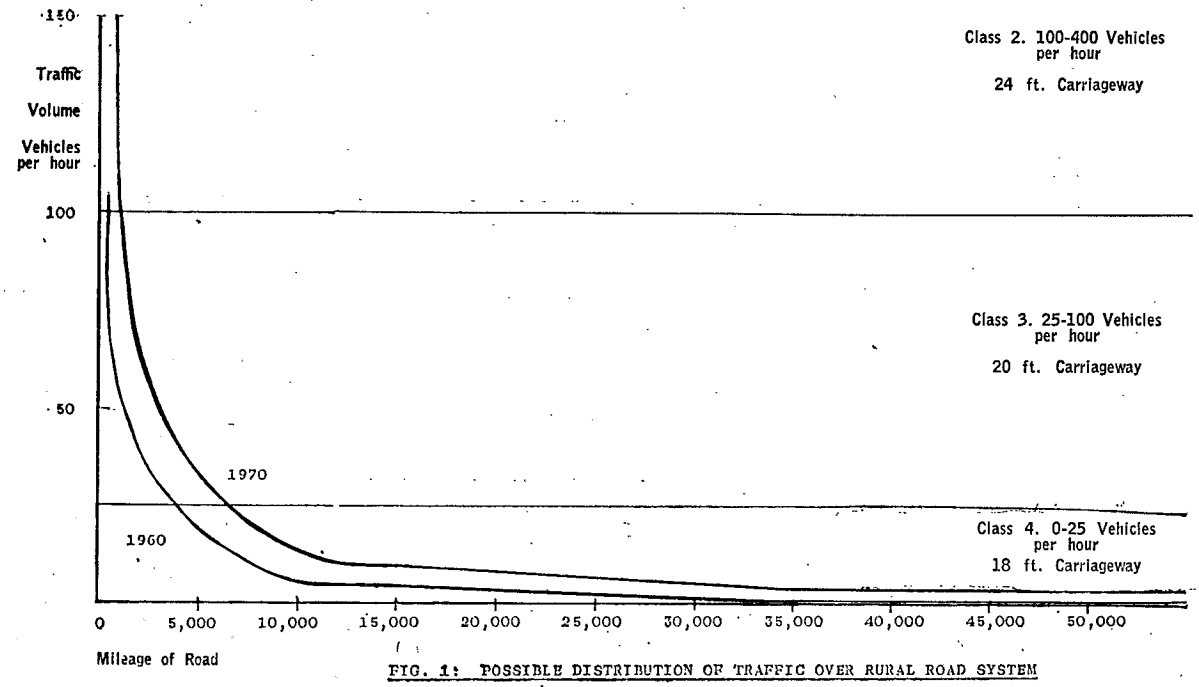


FIG. 1: POSSIBLE DISTRIBUTION OF TRAFFIC OVER RURAL ROAD SYSTEM

widening are often carried out simultaneously so that it is difficult to suggest figures for alignment requirements over and above those for widening.

Somewhat the same difficulty arises in the case of requirements for by-passes in that there are no simple criteria for roughly determining whether a by-pass would be worth while. However, there are few inland towns of sufficient size to constitute serious obstacles to through traffic which is in any case light, and most of the larger towns and cities lie near the coast with rather special by-pass problems if any. The only substantial towns where by-passes might be worthy of consideration seem to be Dundalk and Drogheda with populations of about 20,000 and lying on Dublin-Belfast routes.

In sum therefore, total investment requirements for rural roads (defined as those outside the County Boroughs and County Dublin), to accommodate a doubling in traffic may be put at about £60 million over the 10 year period or, at £6 million a year substantially the same as the 1961 level of road investment. In addition, however, must be added the rural investment required to bring the present road system up to the standards for present traffic volumes given in Table 13 and to strengthen and improve the road system in ways that are more a matter of engineering assessment than of economic or statistical estimation.

The total rural investment required over the 10 year period might be of the order of £100 million, therefore, but it would be impossible to suggest or recommend an investment programme of this magnitude for the following reasons :—

(i) Although the standards given in Table 13 may be accepted for a modest investment programme, they are not necessarily acceptable as a basis for a considerable increase in investment.

(ii) Rural traffic volumes are generally so light that rates of return from improvement will tend to be small, and by the same reasoning losses from failure to improve will also be small.

(iii) There are other demands for investment in the economy with which road investment must be reconciled and even in the transport sector alone, the deficiencies in Ireland seem to be more in the lack of vehicles to operate on the transport network, than the transport network itself.

Reverting to the methods used and the estimates made in this paper it must be emphasised that having necessarily followed a global statistical and abstract approach, they cannot be systematically backed by any direct data on traffic volumes on particular stretches of road and further information on rural traffic volumes is required. They must remain, therefore, as tentative estimates of orders of magnitude rather than as a basis for a firm investment programme, for which direct measurements of traffic volumes and road widths, etc., are essential. It must be emphasised too, that not all rural traffic volumes will fit the global picture presented in Figure 1. In particular traffic volumes on the semi-rural approaches to Dublin (which here have been classified as urban) may be higher than any volumes suggested in these figures. Thus on the T.5 trunk road between Dublin and Naas to the south-west the average daily traffic volume (24 hours) in July 1960 was recorded as 6,854[23] which on the conventions used here, is equivalent to a typical traffic volume of about 428 vehicles per hour. Other traffic flows on Dublin approaches are Dublin-Drogheda to the north, April 1959 near Swords, 5,357 vehicles per 14 hour weekday[23] (about 400 vehicles per hour) ; Dublin-Bray to the south-east, July 1960, 11,467 vehicles per 24 hour day[23] (717 vehicles per hour) ; and Dublin-Leixlip to the west at Lucan in November 1956, 3,405 vehicles per 24 hour day[23] (213 vehicles per hour or some 260 vehicles per hour in 1960 adjusting for current trends).

## Urban Traffic Problems—Dublin

From rough observations and experience of urban traffic problems it appears that for towns and cities with populations below 50,000 to 100,000 urban traffic problems are neither very serious or very expensive or intractable to solve by relatively modest adjustments to the behaviour of traffic and to the road system, e.g., by-passes. Thus the cities of Cork (population 78,000 or 115,000 including suburbs[9]) and Limerick (51,000[9]) seem to lie somewhere near this broad margin of intractability and the really serious traffic problems seem to arise in Dublin (population 535,000 or 661,000 including suburbs and Dun Laoghaire Borough[9]).

At the present time the traffic problem in Dublin is being measured, surveyed and analysed and until this study and analysis is complete it is only possible to give a general analysis of urban traffic problems as applied to Dublin.

The number of vehicles licensed in Dublin County and County Borough has increased by 88 per cent. between 1951 and 1961 as compared with an increase of 109 per cent. for the country as a whole,[1] and traffic censuses in the centre of Dublin have shown that between 1938 and 1959 when the number of vehicles licensed trebled, traffic volumes have only doubled.[24] On the whole,

therefore, traffic volumes in Dublin seem likely to increase by less than the national average and from the above the likely increase may be put at between 3 per cent. and 5½ per cent. per annum equal to an increase of 35 per cent. to 70 per cent. over 10 years.

In most respects the road situation in Dublin resembles that in most other European cities of comparable size. Traffic volumes on some roads in the centre of the city exceed 1,000 vehicles per hour (both directions, 8 a.m. to 6 p.m.) with the highest traffic volumes in 1959 at O'Connell Bridge 2,174 vehicles per hour[24] (both directions) and O'Connell Street, 1,891 vehicles per hour. At an outer cordon roughly corresponding to the city boundary total daily traffic flow (8 a.m. to 6 p.m.) at 26 points in 1961 was 10,740 vehicles in both directions and at an inner cordon corresponding to the southern ring and the North Circular Road total volume at 29 points was 20,320 vehicles.[24] In March–April 1962, a survey of journey speeds (i.e. making allowance for time spent stationary) was carried out on 8 runs over 67.7 miles of roads from the centre to the boundaries of the city, giving an average journey speed of about 19 m.p.h., the highest speed for a run being 21.9 m.p.h. and the lowest 11.75, the lowest journey speed recorded on any road being 7.8 m.p.h.[24] Thus, Dublin is considerably less congested than other larger cities such as London where average traffic flow is some 1,600 vehicles per hour on 36 miles of central streets, average journey speed is about 11 m.p.h. and the lowest journey speed is about 4 m.p.h.[25] It also seems less congested than other more comparable cities such as Glasgow and Newcastle which had average speeds of 8 and 9 m.p.h. respectively in their central areas.

To remedy the increasing congestion that is likely to arise from probable increases in traffic there are several approaches to the problem some of which are alternatives about which there is some controversy.

Initially there is the fairly modest traffic engineering approach, i.e., the better use of existing facilities by making adjustments to the existing road system and to the behaviour of traffic.

Following some (but by no means all) the suggestions of Feuchtinger,[26] who initiated the current survey and analysis of the Dublin traffic problem, the following measures seem to be the most important.

## Road Layout and Equipment

(i) Greater use of road markings which on Dublin's wide streets would encourage greater lane discipline and the positioning of vehicles at intersections so as to make greater use of available capacity (but see under parking below).

(ii) Greater use of traffic signals at busy intersections rather than police control, with linked systems where appropriate, e.g., O'Connell Street. This might reduce delay because there is some British evidence that police, by choosing to clear traffic in each direction fairly fully, choose a much longer cycle than that which can be calculated to minimise delay and which can be set on traffic signals. However, at complicated intersections where there are many possible movements and phases, e.g., O'Connell Bridge, the optimum cycle time may be very long and police control with the use of individual judgement may reduce delay below that obtained by rigid signal settings.

(iii) The greater use of roundabouts at spacious complicated intersections, e.g., Ballsbridge, where turning movements are difficult and dangerous and might be assisted by the channelling and sorting effects of a roundabout.

(iv) Greater use of one-way streets and the banning of right hand turns even though the possible reduction in delay may be offset by the greater distances and inconveniences suffered by road users.

## Road Users' Behaviour

Road users' behaviour is individualistic and disorganised by European standards and this might be remedied, albeit slowly, by the introduction of driving tests for motorised vehicles and the resultant imposition of standard (and more skilful) driving techniques. Greater control and discipline of the pedestrian and the cyclist may also be desirable and worth-while, even though this raises fundamental issues of behaviour and freedom, e.g., the greater tolerance shown by road users towards each other in Ireland, and must, therefore, be approached with considerable caution.

## Parking

Observation suggests that there is a considerable shortage of parking space in relation to demand towards the centre of Dublin and that much of the parking space is occupied by people travelling to work by private car who occupy parking space for long periods, at the expense of the shorter-term parker. Control by parking meter and the price mechanism seems to be the appropriate remedy, although it cannot be recommended that there should be any specific discrimination against the long term parker, as is the practice in other

countries,* since the price and period of parking would in themselves be appropriate deterrent to the longer-term parker.

Street space having been allocated clearly between the demands of moving traffic and those of the parker and appropriate prices having been set so as to sell all parking space in the busy hours of the day, apart from reserves of empty spaces of say 10 per cent., off-street parking space, if demand warrants, can then be supplied by normal commercial enterprise or by the city authority provided that sound pricing policies are followed† and that such parking space is not subsidised by parking meter revenues or from other sources. This seems preferable to the system in Britain where off-street parking is subsidised by meter revenues and from other sources, such subsidisation stimulating the growth of travel to work by car in peak hours, and aggravating already serious traffic problems. Providing that subsidy is avoided, control of parking by meters and the provision of off-street parking at commercial rates should go some way towards expressing the cost of road use to the road user and thus towards achieving a more fundamental solution to urban traffic problems (see below). Also the greater control of parking should reduce indiscriminate parking and double parking which are strong deterrents to better lane discipline and to the better use of the existing road system as outlined above.

Beyond the comparatively modest traffic engineering approach and the question of cross river facilities which are obviously important, lie two largely alternative approaches for a more radical solution to the urban traffic problem, the expansionist method of road construction and the restrictionist approach exemplified by the use of the price mechanism and by bans on traffic.

## Road Construction

The traditional response to congestion both urban and rural has been the expansion of the road system, even though the costs and practical difficulties have generally prevented much road expansion in cities except in the more open and mobile conditions of certain parts of America or where cities have been destroyed. There is a considerable difference in the complexity of rural and urban problems. In the rural situation there are few close alternative routes for most journeys and since the change in traffic conditions consequent on road expansion is generally small, there is little expansion of demand, or " generation " of traffic, consequent on improvement, so that traffic flow at any particular time may be taken as a datum and the width of the existing road simply adjusted to it. In a city, however, with a dense network of streets there are many close alternative routes, the traffic volumes on which may be substantially changed by diversion and " generation " of traffic resulting from improvement from any one route. Again, because existing streets are costly to improve, and because it is not known how satisfactorily the long-established road system meets current demands, new roads become real and attractive possibilities, particularly as they may be designed to avoid the many conflicts between different forms of traffic that occur on existing roads. For these reasons it is necessary to obtain and study the origins and destinations of traffic carefully in order to adjust the road system to traffic demands as closely as possible.

Although, with a considerable amount of skill and expertise this may be done for existing traffic, it is difficult to estimate the changes from so doing and even more difficult to place objective values on these changes and gains so that the " returns " on costly urban road investments may be estimated. An example will serve to illustrate the difficulties in estimating the gains from road improvement schemes in city areas where road traffic volumes are severely damped down by congestion on the existing street system. Two western approaches to London (A.4 and A.40) were improved to quasi-motorway standards with fly-overs, under-passes etc. to join the existing street system some 5 miles from the centre of the city. Between 1959 and 1961 total traffic on these approaches doubled [28] and some of the gains from the improvements must have been absorbed in increased congestion on the existing street system so that the overall effects of the investments must have been only vaguely known. Again no satisfactory means of valuing the largely subjective benefits from improved road travel have yet been evolved (see discussion on valuation of benefits from the London—Birmingham motorway in the Bulletin of the Oxford University, Institute of Statistics during 1961) so that calculations of rates of return from urban investment schemes seem to have little solid foundation as yet.

These difficulties in assessing urban road schemes accurately and objectively are reinforced by increasing doubts as to the efficacy of road expansion as a solution to city congestion problems where

*For example the charges for London parking metres are 6d. per hour for the first 2 hours, plus a surcharge of 10/– for up to a further 2 hours, after which the parker is liable to prosecution. Paying for additional time is prohibited and these charges and regulations constitute a hardship to longer term parkers which is not justifiable by the normal standards of the price mechanism.[27]

†Because of the high costs of construction it is the practice in Britain to charge more for off-street parking in garages than for street parking. Since street parking is less laborious and more convenient to destinations, however, a higher price for street parking is required to use parking space most effectively.[27]

this has been tried on a substantial scale. Thus Gallagher[29] has shown the disappointing results of urban road expansion and the resultant growth of private car transport in 22 of the largest American cities and the trend towards revival of public transport by subsidy and heavy investment with debatable chances of success. Concerning Los Angeles, a city where transport by private car and truck, and road investment to accommodate them, has probably gone furthest, Owen says[30]:—

"The dilemma of Los Angeles is that traffic continues to outstrip the rapid pace set by the road builders. During the rush hours the tremendous jams on major freeway routes have reduced average speed and intensified accident hazards. The wide dispersions of origins and destinations and the tremendous area of the metropolis make the provision and use of public transportation service extremely difficult. Yet the nerve-racking negotiation of the freeways in rush hours is an experience that many motorists find increasingly unpleasant and the question is, whether Los Angeles has built too many accommodations for the automobile or not enough."

Naturally enough, the proponents of urban road investment[31] and of urban motorways have opposed these arguments or argued that with further urban road investment or by more careful planning, urban traffic problems could be satisfactorily solved by road expansion. Nevertheless, based on practical experience and analysis there have been increasing doubts over the effectiveness of urban road investment in Britain and America over the last decade, and urban road expansion must, therefore, be regarded as a somewhat risky and controversial measure for the solution of congestion problems on a city scale.

## Restrictionist Measures

As doubts about the efficacy of road expansion as a solution to city traffic problems have grown, so more detailed analysis of the nature of urban congestion during the 1950's has brought a change in thinking on the urban traffic problem. It now seems to be widely accepted by economists in Britain* (and by some in America) who concern themselves with the problem, that the immediate cause of urban congestion is the wide divergence between the costs (objective and subjective) borne by the individual vehicle and the total costs attributable to its passage including the congestion costs imposed on other vehicles. The general taxation borne by the individual vehicle is insufficient to close this gap between private and total costs under very congested conditions and insufficient to justify the heavy costs of expansion of the road system in urban conditions. This thesis has been stated many times and only a few statements of it can be mentioned[32 33].

In addition town planners have taken an increasing interest in urban traffic matters during the 1950's emphasising "the private benefit public nuisance" aspect of the road vehicle under very congested conditions[34] and the dangers of indiscriminate road expansion[35], although not necessarily supporting the restrictionist approach and not necessarily opposed to urban road expansion if carried out with due regard to the many other interests and considerations in the city.

Restriction may take many forms ranging from outright bans on particular classes of vehicle or on users to various possible instruments for recording appropriate charges to vehicles for the degree of congestion encountered all of which seem to encounter practical difficulties. Rejecting bans on various classes of user as arbitrary and rejecting the various instruments suggested as too complicated, there seem to be two main ways of imposing a price system on road users for the use of congested roads, by charges or surcharges on parking and by charges to enter the whole central congested area at congested times of the day. Charges on parking have the advantage that they can be related to the degree of congestion encountered on journeys to the various parking areas, whilst charges to enter a certain congested area, although more arbitrary and more costly to impose, would have the advantage of a clear cut division between free and restricted areas so that facilities can be arranged for transfer from private to public transport. In this connection the Southern Ring and the North Circular Road in Dublin seem to be the natural boundary between any possible restricted and free areas, since vehicles not wishing to visit the central area could freely use these circumferential routes. Also the experiment by C.I.E. in providing free car parking and encouraging the public to transfer from private to public transport at their garage at Donnybrook is interesting and might be worthy of extension as congestion increases, whatever is done about the Dublin traffic problem.

However, apart from the practical difficulties, an attempted solution to the Dublin traffic problem via the price mechanism, would encounter strong opposition from public opinion and probably the furthest that a price system could be taken and perhaps would need to be taken, would be the imposition of normal "market" prices on parking outlined above.

Clearly the major decisions on the Dublin traffic

*In particular a paper to the Ministry of Transport by two university economists, advocating use of the price mechanism, must be mentioned. It has been broadly supported by a further six university economists including virtually all those directly concerned with transport in Britain.

problem must await the findings of the traffic engineering consultants. However, the traffic engineering approach points naturally towards the constructional solution, about which there have been increasing doubts in other countries and to which there is a much cheaper and less risky (because reversible) alternative in the price mechanism, even though it is difficult and unpopular to impose and has not been tried out at all radically.*

If a constructional solution is adopted for the Dublin traffic problem it would hardly seem attainable for less than a total expenditure of several million pounds spread over several years.

Total investment requirements over the 10 year period therefore might be put at something over £100 million as compared with total road investment expenditure of about £6½ million in the year 1961–62 but for the reasons given above it is not possible to give such a large expenditure a reasonably high priority. A more realistic limit to the expenditure that could be justified on the road system over the 10 years is likely to be set by the proceeds of vehicle licence duties which are paid into a road fund which is devoted to the improvement and maintenance of the road system. On the rates of growth projected in Table 7, the proceeds of the present vehicle licence duties may be expected to yield some £80 million to £90 million over the 10 years, 1962–71 inclusive. Even this sum however must be regarded as very much an upper limit for there are strong objections to the financial device of earmarking the proceeds of a particular tax to a particular form of expenditure. Budgetary efficiency demands that taxation be raised in the most efficient way over the whole of the economy, and that correspondingly expenditure be laid out in the most efficient way. Only by chance will earmarking fulfil these objectives and it may encourage extravagant investment if the earmarked funds exceed the worth-while investments that can be carried out, as may be the case in future years.

## ACCIDENTS

In 1960 there were 302 persons killed on Irish roads and 5,451 persons injured (broadly speaking those detained in hospital) a total of 5,753 persons. This represents an increase of 24 per cent. over 1950 of which 20 per cent. took place between 1959 and 1960, as compared with a 120 per cent ncrease in the number of vehicles over the period. It is usual, however, for casualties to increase at a lower rate than the numbers of vehicles licensed or than traffic volume.

Thus in 1960 approximately 0·011 per cent. of the Irish population was killed on the roads and 0·19 per cent. of the population injured as compared with 0·013 per cent. of the population killed in Great Britain and 0·16 per cent. of the British population[17] injured sufficiently seriously as to be detained in hospital.

Related to estimated motor-vehicle mileage, however, the death rate on Irish roads in 1960 may be calculated as 10·3 per 100 million vehicle miles as compared with 9·8 for Great Britain[3], and the injury rate may be calculated as 1·86 per million vehicle miles in Ireland as compared with a serious injury rate of 1·18 per million vehicle miles in Britain[3]. Differences in definition particularly of injuries may make comparisons between Ireland and other countries hazardous however, especially for wider comparisons with Western Europe. Britain seems to have low accident rates per head and per vehicle mile as compared with the rest of Western Europe however[36].

Thus, although per head of population the risk of death but not injury on the road is slightly less in Ireland than in Britain, related to motor vehicle mileage the risk of death and injury seems somewhat greater in Ireland. Since the attention given to safety and road accidents is apparently less than in Britain this suggests that greater attention should perhaps be given to road safety. In particular the sharp rise in casualties by 20 per cent. between 1959 and 1960 (partly reversed between 1960 and 1961) and the rise in road deaths by 10 per cent. between 1960 and 1961 seem to warrant special attention to present trends in road casualties.

## SUMMARY AND CONCLUSIONS

1. The major phenomenon on the road system of Ireland in the next 10 years is likely to be the growth in the number of vehicles and in traffic. It is considered that car ownership is likely to grow at about 3 times the rate of increase in gross national product per head, and assuming that this increases by 3 to 4 per cent. per annum, with a stable population and present rates of taxation, the vehicle population is expected to slightly more than double over the next 10 years. Vehicle mileage, however, is only expected to double over the period.

2. Concerning transport facilities for the user the growth of private transport is likely to accentuate the difficulties of operating rural bus services, and the licensing restrictions on the operation of goods vehicles for reward which were imposed almost 30

*Although certain cities, e.g., Venice, ban motor vehicles for obvious reasons and it is understood that charges for entering part of the central area are imposed on vehicles in Valetta, the capital of Malta.

years ago, seem to call for review, as do the vehicle license duties on commercial vehicles over 2 tons unladen weight.

3. In providing for future increase in rural road traffic and in strengthening and improving the rural road system, on present road standards, a tentatively estimated capital expenditure of about £100 million seems to be required over the 10 year period. Because of the general lack of pressure of traffic on the rural road system, and because of other investment demands in the rest of the economy it is impossible to support such a high rate of road investment as this. In practice a more realistic *upper* limit is likely to be set by the proceeds of the road fund which can be expected to total some £80 or £90 million over the period. It is important, however, that a firm road investment programme based on actual traffic volumes and road characteristics should be drawn up.

4. Concerning the urban problem of Dublin, beyond a modest expenditure on measures to make better use of the existing road system, lie two controversial alternatives, a difficult and unpopular restrictionist approach to traffic in congested central areas, and a difficult and costly constructional solution, the costs of which would be in addition to the estimates made above.

5. Although in relation to population and to estimated vehicle mileage, accident rates in Ireland are low by European standards, greater attention to road safety (again by European standards) seems to be required.

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