Tarka Accord

Theoretical Application / Revision of and Benefits of Public Transport

Author - Oscar C. Kelly | Tarka Accord Director
Contributor - Fin Carlyon
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Introduction:

The purpose of this report is to analyse the benefits of effective public transport and how they can be applied in Northern Devon in the context of theoretical improvements, additions and/or redesigns of the current system. A good understanding of the benefits and drawbacks of public transport systems when applied to Northern Devon will be essential for the further implementation of public transport in Northern Devon in the future.

Congestion:

One of the arguments surrounding public transport systems is their effect on traffic congestion and many organisations have produced material on the topic.

Possible Misinformation:

As a point of concern when analysing information on the topic of traffic congestion relief as a benefit of public transport systems, the topic may be somewhat divisive with a possible threat of misinformation. An article from the Public Transport Users Association (or: PTUA) (1) suggests this to be the case with the title of their article being 'Myth: Public Transport Doesn't Help With Traffic Congestion' with it later establishing that the fact of the matter is that "it is difficult, but not impossible, to alleviate traffic congestion in cities that have built a lot of roads. But even if public transport doesn't quite achieve the 'gold standard' of reducing congestion, its real importance is that it allows people to get around without adding to congestion, and ideally without sitting in traffic at all".

To further elaborate upon the topic of possible misinformation within the topic of traffic congestion relief from public transport, the PTAU later in the article suggests that a 2009 study called 'The Fundamental Law of Road Congestion: Evidence from US cities' by Gilles Duranton and Matthew Turner is a prominent source of misinformation on the subject matter with the source claiming that "the provision of public transport has no discernible effect on road traffic volumes or congestion". The PTUA suggests that the study's use of the size of the peak bus or train fleet as a metric for the provision of public transport inaccurately presents the provision of services as it omits the quality of the service.

Further fallacies in the criticism of the positive impact of improved public transport on traffic congestion can be seen in an article written by Ramanath Jha for the Observer Research Foundation (2). The significant issue with the article about the

aforementioned subject matter is when Jha claims that "the claim that public transport reduces traffic congestion is not always borne out" and then continues to give examples of highly congested cities with extensive and/or growing public transport networks. The issue with this being used as evidence is that it doesn't prove that improved public transport systems were the cause of the congestion so it is also possible that these congested cities would be even *more* congested without these public transport systems.

The Congestion Benefits:

The notion previously mentioned that already congested cities could be more congested without their public transport systems is suggested to be correct with information in a paper written by Michael L. Anderson for the National Bureau of Economic Research (USA) (3). The paper is a study on how a 2003 public transport worker strike in Los Angeles affected travel in the city and found that there was an average delay increase of 47% for highways. Anderson continues to comment that: "this effect is consistent with our model's predictions and many times larger than earlier estimates, which have generally concluded that public transit provides minimal congestion relief. We find that the net benefits of transit systems appear to be much larger than previously believed".

In addition to Anderson in his report for the National Bureau of Economic Research (USA), the Public Transport Users Association (or 'PTUA') continues in the previously mentioned article (1) and outlines a phenomenon called the 'Downs-Thomson paradox' of which "is best known for describing… an 'equilibrium' process". The meaning of this equilibrium process is that when the quality (or "inconvenience", as described in the PTUA article) of various modes of transport are equal then there will be no major shift to one mode of transport or another as users will not be convinced to swap from one mode of transport to another.

The PTUA then extrapolates using a book called 'Great Cities and Their Traffic' written by J. Michael Thomson and how the optimum (a state "where no traveller will improve their journey by changing mode") can change due to alterations of policy. Elaborating upon this, the article explains that the increase of road size will only increase the amount of people travelling by car due to the equilibrium described in the Downs-Thomson Paradox being broken with an increased benefit to travelling by car caused by the road extensions. This process of transition would then continue until a new optimum would naturally be found. Due to this process, the PTUA claims that "'improving' roads can leave things not just as bad as before, but worse". Alongside this process with improved roads failing to solve congestion,

the state of public transport would also deteriorate in response to decreasing patronage with users swapping to using cars.

As the inverse of this process of extended/improved roads failing to improve poor congestion, the PTUA suggests that improving public transport services would decrease congestion because "making public transport more convenient… will lead some people to choose public transport instead of driving the car". Logically, the optimum would shift to having a higher percentage of the population travelling by public transport and a lower percentage of the population travelling by car (and other modes of transport). The reason why this particular shift would decrease congestion is because the roads built to facilitate car travel would continue to exist, simply with less vehicles on those roads.

Health and Environment:

In an article published by the Rapid Transition Alliance (or: the RTA) on their website (4), it is outlined how a free public transport system can provide health and environmental benefits. Although what is mentioned in the article specifically refers to *free* public transport, of which would make the benefits more noticeable, the points are still likely to apply when it comes to *improved* public transport systems of which aren't necessarily free. The level of improvement, and therefore the degree of shift in the 'optimum' outlined previously in this report, will likely scale alongside the level of benefits as outlined in the article by the RTA.

One of the points raised in the article is that reducing the amount of cars on the road by improving public transport systems (and therefore incentivising transitioning away from cars) would reduce the amount of air pollution created by the burning of fossil fuels in combustion-powered vehicles. The RTA continues to say that "40 cities and towns [in the UK] exceed the WHO pollution limits, with more than one in 19 deaths in these cities and towns related to long-term exposure to PM2.5 – one of the dominant emissions from cars' exhausts".
Another point raised in the article is that a transition to a higher percentage of people using public transport would aid in reducing energy consumption due to a reduced amount of vehicles on the road, leading to less emissions and a reduced impact on the climate.

Although only briefly mentioned in the RTA article, the reduced amount of vehicles on roads would also contribute to a reduced amount of road accidents involving both motorists and non-motorists.
In addition, the decrease in road infrastructure construction due to the prioritisation of public transport could limit the damage caused to the local environment.

Northern Devon:

This section of the report will be in the theoretical context of expanding, improving and/or restructuring the current public transport system in Northern Devon to increase its effectiveness and to maximise the benefits which public transport can provide as outlined previously in this report.

Much (if not close to all) of the information on the research, theory, logistics, implementation, and understood benefits of improved public transport systems is in the context of large and densely populated urban areas. The primary reason behind this is likely because large and densely populated urban areas are the places of which need high-quality public transport systems and, because of that, the places where the information and implementation has been focused. Because of the different constraints provided by Northern Devon as a region, the specifics of improving the Northern Devonshire public transport system would have to be different from what is commonly espoused.

Unofficial Geographical Terminology:

Much of the geographical terminology in this report was originally defined in a previous report written for Tarka Accord covering population change in Northern Devon (5). The reason why unofficial geographical terminology was created in the report was due to the ineffectiveness of official terminology when it came to more accurately defining local regions and settlements.
The unofficial terminology, and the meanings, are listed below:

- Northern Devon:
  'North Devon' is the colloquial way of referring to the North of Devon and the communities within it. The use of this term to refer to the entirety of the North of Devon is problematic in an official sense due to the separation of the region into North Devon District and Torridge District with the official use of 'North Devon' referring to the district of which doesn't fully encompass the colloquially defined area. The unofficial term 'Northern Devon' was created in the report to refer to North Devon District and Torridge District simultaneously to help avert that issue.
- The Taw/Torridge Area (or, TTA):
  It was found in the report that a large area surrounding the Taw and Torridge rivers had a noticeably higher population density than the average for Northern Devon with roughly half of the total Northern Devonshire population living within the area. Due to the regions' apparent significance, it

was decided to define the area. There were two ways that the region was defined in the report:

- The *Lesser* Taw/Torridge Area (or, LTTA):
  All parishes of which border the Taw, Torridge or Taw & Torridge Estuary.
- The *Greater* Taw/Torridge Area (or GTTA):
  All parishes of which border the Taw, Torridge, Taw & Torridge Estuary or any other parish that borders one of the aforementioned.

As to exclude areas further in-land that have little-to-no connection with the main urban centre, the Taw and Torridge were considered to begin in Barnstaple and Bideford & Littleham respectively.
The shortenings of 'TTA', 'LTTA' and 'GTTA' did not originate in the previous report and were, rather, developed in this report.

- Other Noteworthy / Prominent Settlements:
  Although being less of a specific term to describe a particular region, this was a blanket term used in the report to refer to Ilfracombe, South Molton, Great Torrington and 'Greater Holsworthy' collectively. The reason why these places were defined as noteworthy / prominent was due to their relatively high populations and densities when compared to elsewhere outside the TTA. Both 'prominent' and 'noteworthy' were used for this collective term in the report, only 'prominent' will be used furthermore in this report.
- Greater Holsworthy:
  For the purposes of defining other prominent settlements, 'Greater Holsworthy' was created as a combination of Holsworthy Parish and the Holsworthy Hamlets Parish.

Population Density:

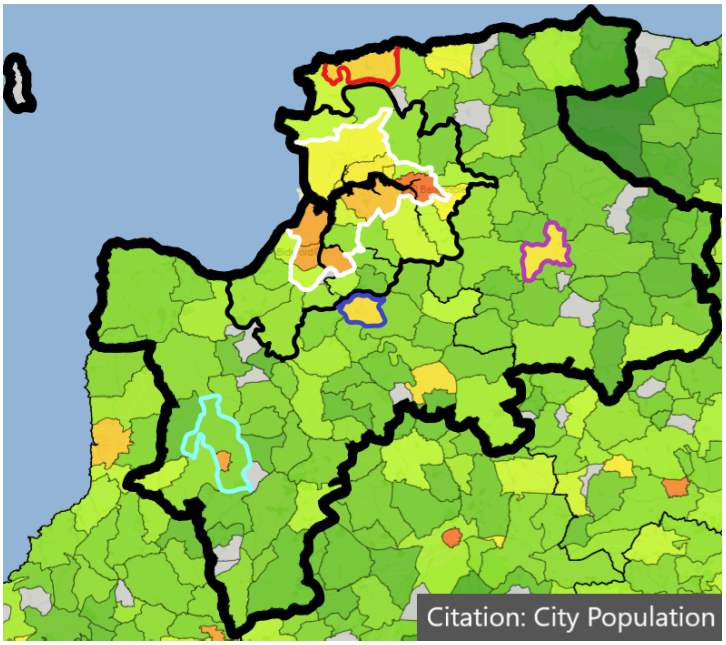
One of the ways that Northern Devon and larger urban areas differ is population density. Population density is an important factor regarding the planning and effectiveness of public transport systems. In an article written by Caitlin Rollsin for Centre for Cities (6), the importance of population density is elaborated upon. According to the article, the distance of which the network extends and density of the 'catchment area' (of which is described in layman's terms in the article as the "residents around public transport stops") are both important factors of population density when in regards to public transport services.

In the article, Rollsin argues that "increasing the density around public transport stations, both existing and new, helps to maximise the number of people who can easily access the network", and that "proximity to transport stops is a key factor in encouraging usage". Extrapolating from the information provided, when population

density increases so does the cost efficiency of the public transport system; this is due to the network having a higher amount of paying individuals in an area (either customers or taxpayers) funding a network of which has to cover less distance per-person comparatively to an area with lower population density.

When applying these principles to Northern Devon, information on population amount, density and change in the aforementioned can be drawn from the previously mentioned report written for Tarka Accord on the topic of population change in Northern Devon (5). In the report, it is outlined that the TTA and four other prominent settlements outside of the area have significant populations and population densities.

Most of the population statistics for the report and the map used in the report came from the website 'City Population' (7). The map, in question, was edited in the report to present the borders of Northern Devon and the TTA (both the LTTA and the GTTA). For this report, more borders were added around the other prominent settlements to aid in visualising them:



- Map Key:
    - Northern Devon = Thicker Black Border
    - The TTA:
        - The GTTA = Thinner Black Border
        - The LTTA = White Border
    - Other Prominent Settlements:
        - Ilfracombe = Red Border
        - South Molton = Purple Border
        - Great Torrington = Dark Blue Border
        - Greater Holsworthy = Cyan Border

On the map, parishes are graded from green to yellow to red with green representing less densely populated areas and red representing more densely populated areas. More detailed population density statistics can be obtained on the 'Northern Devon Population Change' report and from City Population.

When applying the relationship between population density and public transport to population statistics for Northern Devon, it can be inferred that the design and implementation of an improved public transport system would have to be concentrated within the TTA. Perhaps, the system may have to be concentrated specifically within the LTTA due to its comparatively high population density when compared to the remainder of the GTTA.

Extrapolating from this, the other prominent settlements in Northern Devon outside of the TTA would likely need effective public transport systems within the settlements yet also connecting routes to the TTA. The length of these connecting routes would have to be considered due to the fact that an increased length along a less densely populated area would reduce the cost efficiency of the route. This would likely not be a prominent issue for Ilfracombe and Great Torrington due to their immediate proximity to the TTA (*Greater*, specifically) yet the distances from South Molton and Greater Holsworthy to the TTA would likely pose an issue for the development and maintenance of effective connecting routes.

The connecting routes for South Molton and Greater Holsworthy could have their cost efficiency issues offset to varying degrees by: subsidies from the rest of the public transport network, connecting to other settlements en-route to provide further revenue, reduced service on the routes to reduce costs, etc.

Due to the drawbacks of lower population density for public transport - people in places outside of the TTA, other prominent settlements and connecting settlements between the aforementioned would likely have to rely on the car for travel.

Additionally: it could be beneficial to consider express routes between the main population centres within the TTA for faster travel between those areas as it could incentivise car users who commute between them often to swap to the network.

Forms of Public Transport:

There are various forms of public transport that exist. The two forms that currently exist in Northern Devon are buses and rail. The bus network in Northern Devon is very extensive when compared to the single rail line from Barnstaple to Exeter that connects to various other settlements on the route.

When considering redesigning or adapting the current public transport system in Northern Devon to be more effective, it would likely be the most cost efficient and least time consuming to utilise buses as the main form of public transportation due to their already prominent usage and also the reduced need to build more infrastructure, buy more vehicles and train more staff; other forms of public transportation would not have those same advantages.

However, due to the prominence of the Barnstaple-Exeter line for connecting Northern Devon to outside of the area, it would likely be beneficial to further connect the short rail line with the bus network in Northern Devon to allow for more fluid movement along the public transport system.

Health and Environment Benefits:

Previously in this report, using an article written by the RTA (4) as a guide and for information, four health and environmental benefits of effective public transport were outlined. These being:
The reduced number of vehicles on the road caused by the prioritisation and implementation of effective and accessible public transport:

1) …will reduce pollutants from combustion-powered cars through their exhausts, therefore also reducing the number of deaths caused by said pollutants.
2) …will decrease the amount of energy consumed for transport, of which would therefore reduce the impact on climate change.
3) …will decrease the likelihood of fatal accidents caused by said vehicles.
4) …will reduce the need to build more road infrastructure, this outcome additionally being caused by the abandoning of the failed idea of increasing road infrastructure in order to facilitate cars in an attempt to reduce congestion. This would, logically, lessen the impact on the local environment due to the reduced construction.

When applying the principles behind an effective and beneficial public transport system outlined in this report to Northern Devon and the concept of improving or redesigning the current public transport system in the area, these health and environmental benefits would likely be relatively minimal. The reason behind this is that the number of cars taken off the roads would be reduced when compared to larger and more densely populated urban areas. Although, it is still worth considering implementing a more effective public transport system now as that would still be beneficial for future urban development, and the health and environmental benefits would likely become more noticeable over time.

Conclusion:

Population Density

The effectiveness of a public transport system can be largely dependent on the population density of the area of which the network exists. Higher population densities not only increase the amount of users (of whom are likely to pay through fare fees or tax) but also decrease the effectiveness of car-centric transport systems due to a reduction of road space per-person, of which both incentivise the implementation of effective public transport.
Considering this, the following would have to be considered when adapting or redesigning the public transport system in Northern Devon:

- Densely populated areas such as the TTA alongside other prominent settlements outside of the TTA would benefit from effective and robust public transport within the urban areas.
- The TTA would likely need express routes that connect some of the more densely populated areas within the TTA to one-another.
- Connecting routes from the other prominent settlements outside of the TTA to the TTA would have to be designed, with the ones connecting South Molton and Greater Holsworthy to the TTA likely needing to undertake various measures to increase income and reduce costs (including possible subsidies from the rest of the network) due to the relatively large distance between those settlements and the TTA when compared to Ilfracombe and Great Torrington.
- Settlements of which exist outside of the TTA, other prominent settlements and/or the connecting routes between the aforementioned would have to be excluded from the network due to the relatively high costs to connect them to the network. These areas would, therefore, have to rely on the car.

Shifting the Optimum and Equilibrium:

In order for an improved public transport system to provide the benefits that this report has espoused, the system would need to be designed in a way to convince car users to transition away from cars and to public transport usage. In order to convince them, there would need to be clear benefits to make the swap. As outlined by a source in this report, ‘free’ (taxpayer funded and free on point of usage) public transport systems have been implemented in many places in the past. Alongside a free (on point of usage) system, some public-transport-only infrastructure could be built in order to reduce congestion for users of the system and not for car users. Both of these factors, alongside factors of which have not

been mentioned in this report, would be beneficial to implement in an improved public transport system as it would incentivise car users to swap to using the network due to there being an increased benefit to using the system over using cars.
Additionally, these benefits would have to be advertised to a degree in order to communicate them with car users. A possible way of doing this could be advertising the benefits on the back of buses.

Benefits:

There are various benefits that Northern Devon, specifically the areas of which the network extends and could extend, could receive from prioritising an improved or redesigned public transport system and from that system's ability to reduce the percentage of the population driving cars. Although these benefits may be less impactful when compared to larger and more densely populated urban areas, they are still likely to be present.

- Congestion: While reducing the amount of vehicles on the roads, the roads remain at the same size; this reduces congestion.
- Land Usage: When prioritising public transport, there is less of a need to increase road sizes. This decreases the amount of land used for transport, enabling that land to be used for other purposes or to simply be left to nature.
- Pollution: Reducing the amount of vehicles on the road will decrease the amount of pollution created in energy production and in combustion-powered vehicles, reducing the impact on climate change and on air quality (and, therefore, health).
- Vehicular Accidents: Fewer vehicles on the road will logically correlate with a reduced amount of deaths caused to motorists and non-motorists from vehicular accidents.

Citations:

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