METHODOLOGY

AVERAGE JOURNEY TIME ON KEY ECONOMIC CORRIDORS

2016 - 2018

INTRODUCTION

Analysis, Statistics and Research Branch (ASRB), a Northern Ireland Statistics and Research Agency (NISRA) branch within the Department for Infrastructure (DfI), is responsible for the production and publication of the 'Average Journey Time on Key Economic Corridors' statistical report.

The first report was published in September 2019 and provides an estimate of the average time it takes for a car to travel the inter-urban sections of all five Key Economic Corridors (KECs) in both directions during the morning peak period (07:00 to 09:30). The information is also split into the journey times for each of the five KECs. Data are currently available for 2016-2018.

The five KECs, often referred to as Key Transport Corridors (KTCs), are defined and used widely within DfI and are part of the Regional Strategic Transport Network of Northern Ireland; these corridors are the top tier of the region's long distance routes connecting the cities and main towns to the major regional gateways and the Belfast Metropolitan Area (BMA). The estimation of the average journey time is focussed on the inter-urban sections of these routes; improving connectivity across these key corridors is seen as a driver for economic growth. Reducing journey times on the urban sections to and from towns or city centres is not an objective as the policy direction for urban areas is about modal shift from private car travel to walking, cycling and public transport.

A map of the inter-urban sections of the KTCs, used in the journey time calculation, can be seen in Figure 1 overleaf:

Figure 1: Map of Inter-urban Key Transport Corridors in Northern Ireland
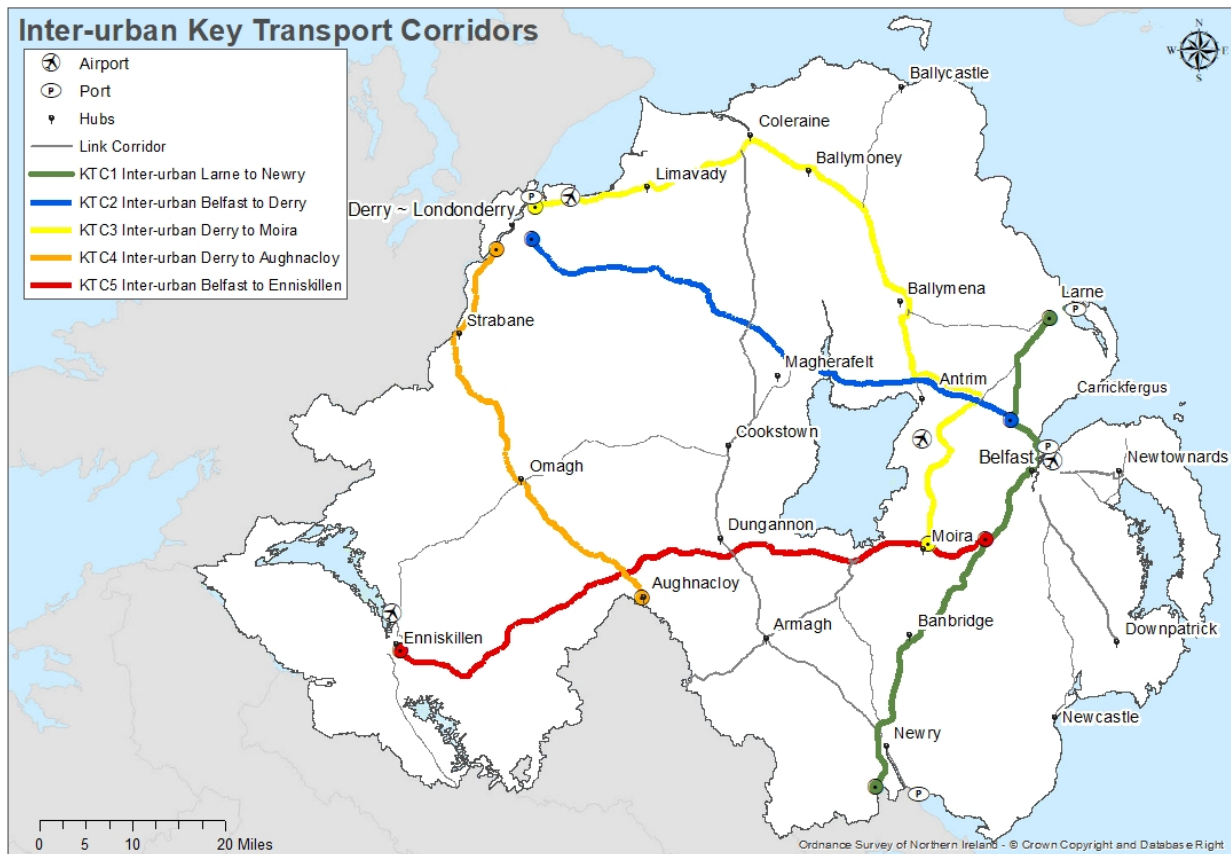
Download Map (JPG format - 397 KB)

* Inter-urban corridors as used in the estimation of the average journey time on KECs.

KTC1: Inter-urban Larne to Newry (Larne/Ballymena Road to A1 Newry); approx. 60 miles.
KTC2: Inter-urban Belfast to Derry/L'derry (M2 Sandyknowes to Drumahoe/Glenshane Road); approx. 60 miles.
KTC3: Inter-urban Derry/L'derry to Moira (Maydown/Clooney Road to Moira); approx. 90 miles.
KTC4: Inter-urban Derry/L'derry to Aughnacloy (Newbuildings to Aughnacloy); approx. 50 miles.
KTC5: Inter-urban Belfast to Enniskillen (Sprucefield to Enniskillen); approx. 70 miles.

The 'Average Journey Time on Key Economic Corridors' statistical report is published on the DfI website. The report includes meaningful commentary supported by tables, a map, a chart and infographics; it also contains information about the background, methodology applied and the quality of the data. A detailed Background Quality Report is also available.

BACKGROUND

The Code of Practice for Statistics requires all producers of official statistics to ensure that the statistics serve the public. The framework for this Code is based on three pillars which support public confidence in statistics:

- Trustworthiness;
- Quality; and
- Value.

ASRB demonstrates its commitment to the Code by publishing statements of compliance with each of these pillars. One of the 'Quality' principles of the Code relates to 'Sound methods' – producers of statistics and data should use the best available methods and recognised standards, and be open about their decisions. This methodology report has been published so that as statistical producers, ASRB, are transparent about the method used to estimate the average journey time, the reasons for decisions taken and any methodological or data limitations.

RELEVANCE TO USERS

The 'Average Journey Time on Key Economic Corridors' statistical report was published following a data development project initiated when a need for data to measure the indicator 'Average journey time on key economic corridors' was identified and added to the draft Programme for Government (PfG) data development agenda.

The Draft Programme for Government Framework 2016-2021 was used as the basis for an Outcomes Delivery Plan (ODP) 2018/19. This ODP, published in June 2018, set out the programme of work the Northern Ireland Civil Service (NICS) was to take forward during 2018-19 to contribute to the objective of 'Improving wellbeing for all – by tackling disadvantage and driving economic growth'. It contains 12 strategic outcomes supported by 49 indicators, including the 'Average journey time on key economic corridors'. This indicator contributes to reporting against Outcome 11, 'We connect people and opportunities through our Infrastructure'. The Outcomes Delivery Plan 2018/19 End-Year Report provides an assessment of progress on the actions contained in the ODP 2018/19. The NICS Board has agreed that the ODP 2018/19 should be extended for a further period pending the return of Ministers to the Northern Ireland Departments.

The methodology and baseline results for this indicator have been agreed by the PfG Technical Assessment Panel (TAP). TAP was established to consider the methodological and technical quality of the population indicators used in the draft PfG, with the overarching purpose to collectively and independently come to an agreement as to the criteria for reporting a change in the PfG indicator.

DATA SOURCE

Following the inclusion of 'Average journey time on key economic corridors' on the draft PfG data development agenda, DfI produced a data development options paper which considered the advantages and disadvantages of potential data sources; these included Moving Observer Survey data, GPS data and Automatic Number Plate Recognition (ANPR) data. It was agreed by a DfI Working Group that use of the ANPR data was the best value for money to deliver the project requirements.

The data source is the Police Service of Northern Ireland's (PSNI) ANPR system. ANPR cameras are positioned at various locations across Northern Ireland and provide good coverage along the five KTCs. ANPR works by scanning vehicle registrations as they pass individual cameras; the observed vehicle registration is recorded along with the date and time it passes the camera and stored in a secure database. The key purpose of the ANPR system is to promote the security and safety of everyone in the community. Further information on ANPR is available on the [PSNI website](). A journey time application was developed to process the high volume of ANPR data according to a specification agreed by a DfI Working Group.

JOURNEY TIME CALCULATION

The average journey time is the average time it takes for a car to travel from the start of the KTC to the end (inter-urban). In reality, the majority of cars do not travel the full KTC route; the ANPR data shows that for some KTCs there were no cars that completed the full start to end journey during the morning peak period. In light of this, each KTC is split into links. A link is based on camera points along a KTC; the journey from one camera point to the next consecutive camera point along a KTC is a link. For the journey time calculations, the minimum number of links along a KTC is three and the maximum is eight. The average journey time for each link is calculated:

Average Journey Time for each Link = Total Journey Time on Link for all Cars

Total Number of Cars Completed Link

The average journey time for a full KTC, in one direction, is then calculated by aggregating the journey times for each link. For example:

Average Journey Time for KTC = Average Link 1 + Average Link 2 + Average Link 3

The data include cars which started on any one of the links within the morning peak period 07:00 to 09:30.

Results are presented in the statistical report as the average journey time on each KTC in both directions for the years 2016, 2017 and 2018. The journey time for travelling the full KTC in both directions is simply the aggregation of the average journey times in each direction. One figure is required as the draft PfG indicator 'Average journey time on key economic corridors'; this is simply the sum of the average journey times on the five KTCs:

Average Journey Time on KECs	=	Journey Time on KTC 1 (Both directions)	+	Journey Time on KTC 2 (Both directions)	+	Journey Time on KTC 3 (Both directions)	+	Journey Time on KTC 4 (Both directions)	+	Journey Time on KTC 5 (Both directions)

CRITERIA APPLIED TO DATA PROCESSING APPLICATION

The journey time application processes the ANPR data based on criteria input by the user. The criteria was agreed within DfI and with the PfG TAP and is outlined below:

Cars only:

At the outset of this project it was agreed that the estimation of the average journey time on KECs would be based on cars only. As a draft PfG indicator, the focus is on the change in journey time over the years with a reduction in journey time contributing to the overall outcome (Outcome 11) of connecting people and opportunities through our infrastructure. It is reasonable to assume that any observed change in journey time experienced by cars, which make up the vast majority of vehicles on our roads, will be similarly experienced by other vehicle types. Including vehicles such as Heavy Goods Vehicles, which may have speed delimiters installed, could mean any change in journey time over the years may be as a result of a change in the proportion of vehicles which have speed delimiters.

Dates for Analysis:

In line with other projects within DfI, only neutral days of the week and months of the year were selected; this follows Transport Analysis Guidance. A Monday to Thursday week in each of the 'primary' neutral months of April, June and November were selected as the preferred options; this allowed for the data to be spread across the seasons and calendar year. Data were not always available for these preferred months. In this scenario the steps outlined in the Process Map for Data Selection were followed; these steps mean that when one neutral week was not available in April,

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June or November, it was replaced by an alternative neutral week in the months of May, September or October. Following this process ensured ASRB were consistent and transparent in the approach to selecting data. Weekends, bank holidays or school holidays were not used. The precise dates selected for each year are included in the following tables:

ROUTE	2016		
	WEEK 1	WEEK 2	WEEK 3
KTC 1	11th-14th April	6th-9th June	14th-17th Nov
KTC 2	11th-14th April	6th-9th June	14th-17th Nov
KTC 3	11th-14th April	6th-9th June	14th-17th Nov
KTC 4	11th-14th April	12th-15th Sept	14th-17th Nov
KTC 5	16th-19th May	13th-16th June	14th-17th Nov

ROUTE	2017		
	WEEK 1	WEEK 2	WEEK 3
KTC 1	3rd-6th April	5th-8th June	13th-16th Nov
KTC 2	3rd-6th April	5th-8th June	13th-16th Nov
KTC 3	22nd-25th May	5th-8th June	13th-16th Nov
KTC 4	11th-14th Sept	9th-12th Oct	20th-23rd Nov
KTC 5	3rd-6th April	5th-8th June	13th-16th Nov

ROUTE	2018		
	WEEK 1	WEEK 2	WEEK 3
KTC 1	16th-19th April	4th-7th June	12th-15th Nov
KTC 2	16th-19th April	4th-7th June	12th-15th Nov
KTC 3	16th-19th April	4th-7th June	12th-15th Nov
KTC 4	16th-19th April	4th-7th June	12th-15th Nov
KTC 5	16th-19th April	4th-7th June	12th-15th Nov

Maximum Journey Time:

A maximum journey time field is included in the journey time application to exclude journey times on links within the KTCs which are longer than 1.5 hours. The limit of 1.5 hours was agreed within DfI and with the PfG TAP – it gives sufficient time during the morning peak period for a driver to complete the longest link (approx. 25 miles) within the KTC so that valid journeys are not excluded; at the same time this limit reduces the potential for including journey times where the driver has stopped along the link or deviated and returned to the link at a later stage.

Standard Deviation:

While the maximum journey time field included in the application seeks to ensure only valid journeys are included, the existence of shorter links, which are estimated to take much less than 1.5 hours to drive, means there is still potential for some invalid journeys to be included in the results. A standard deviation filter was therefore included in the application with the filter set to 3; therefore only the link journey times within 3 standard deviations of the mean are included in the results. This has the effect of excluding extreme journey times, for example where a driver has stopped and the journey time is unreasonably long. Again this criteria was agreed within DfI and with the PfG TAP.

DATA PROCESSING APPLICATION

The journey time application produces output using the ANPR data based on the criteria input by the user. The output details the start point, end point, vehicle count and average journey time taken by observed cars to travel each link (two consecutive cameras) of a KTC for both directions. The output is broken into four different time slots which make up a full 24 hour period: morning peak (07:00 to 09:30); evening peak (16:00 to 18:30); day time off-peak (09:30 to 16:00) and overnight (18:30 to 07:00). The 'Average Journey Time on Key Economic Corridors' statistical report is based on output from the morning peak period (precisely 07:00:00 to 09:29:59) only; this is a key time for travel connectivity.

The application works by initially extracting reads from cameras along a selected KTC (car registrations observed by each camera along with the time and date observed) from the main ANPR database and temporarily storing one day of data at a time. There are functions within the application to check the daily temporary file and discard any car registrations that have been observed more than once during a timeslot at the same camera location. This ensures only unique cars observed at a camera location within a timeslot on any given day are used to calculate a journey time. Using the camera reads, the application calculates the journey time for a car observed at two consecutive cameras (a link) and will only store the result if it is less than the maximum journey time defined in the application by the user (1.5 hours).

DATA SOURCE LIMITATIONS

The nature of the ANPR data means that access is restricted and has only been available to a small number of security cleared statistical staff in DfI. This means that validation is carried out at an aggregated level. Several sanitised dip samples were examined to ensure the journey time application was processing the ANPR data in line with the agreed specification.

Data were not always available for the desired time period as outlined above under 'Dates for Analysis'. A Process Map outlining the approach to the selection of journey time data has been produced; this demonstrates how this issue has been consistently addressed.

The most appropriate ANPR cameras located along the inter-urban sections of the KTCs have been used as the start and end points of the KTCs. As per National Policing Guidelines the locations of ANPR cameras are not made publicly available.

PRODUCTION OF STATISTICAL OUTPUT

When all the relevant data were processed by the application, the results were aggregated as outlined in the 'Journey Time Calculation' section. The final journey times were then estimated, as above, and quality assured (see Background Quality Report for further information). The statistical report with explanatory comments, tables, a chart and infographics was then produced. The process followed to produce the statistical report and associated outputs can be viewed in the High Level Process Map. The Generic Statistical Business Process Model (GSBPM) terminology has been adopted for this process and implementation of it continues for this work area. Process maps created for each relevant phase of the work area are available on request from ASRB.

FURTHER INFORMATION

For further information relating to the methodology around the estimation of the draft PfG indicator 'Average journey time on key economic corridors', please contact ASRB@nisra.gov.uk.

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