

The role of governance in assessing satisfaction with local highways in England

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Abstract

This thesis is motivated by an apparent move away from solely considering costs/budget towards the greater inclusion of satisfaction in performance frameworks. The previous research on satisfaction has, for example, considered population size or advocated merging Local Authorities (LAs) for efficiency. This overlooks how governance can play a role in satisfaction, which is the thesis aim. In turn, this thesis has looked at incentivising satisfaction, the role of perception in satisfaction and the influencing of satisfaction via communications.

With access to a unique dataset that encompasses satisfaction with local highways, regression methods were executed in Chapters 4 and 5. It was found in Chapter 4 that there exists little relationship between the Department for Transport (DfT) Highways Incentive Fund and given performance outcomes including satisfaction. The prior Local Transport Plans (LTPs) had outcomes and a level playing field. Thus, outcomes are implied best practice, but only if attainable by smaller LAs.

Chapter 5 assessed public perception to explore the extent to which satisfaction is within LA control. A key finding was that the public perceive improved road conditions; they responded by reporting higher highways satisfaction but with a lag. This highlights how the public desire improved roads but want this disruption to be mitigated.

Finally, in Chapter 6, a pilot study of Leeds, West Yorkshire was conducted using semi-structured interviews. This chapter focused on grassroots governance and how this governance indirectly influences highways satisfaction by acting as the communications gateway for the public and higher governance levels. Further, this chapter used the

critique of the Arnstein (1969) model to consider how citizen engagement should be dynamic to facilitate improved satisfaction with highways.

There are two inter-related learnings. Firstly, how levels of governance play distinct but complementary roles. Secondly, if recognise each other's roles, they can together yield unparalleled highways satisfaction.

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List of Abbreviations

ANOVA	Analysis of Variance
BVPis	Best Value Performance Indicators
CQC	Cost Quality Customer
CSI	Customer Satisfaction Index
CT	Competitive Tendering
CVI	Coarse Visual Inspection
DfT	Department for Transport
DIY	Do It Yourself
DVI	Detailed Visual Inspection
DVLA	Driver and Vehicle Licensing Agency
ELRN	England Local Road Network
FD	Fairly Dissatisfied
FE	Fixed Effects
FS	Fairly Satisfied
GDHI	Gross Disposable Household Income
GIS	Geographic Information System
GNPF	Garforth Neighbourhood Plan Forum
HMBI	Highways Maintenance Benchmarking Indicator
HMEP	Highways Maintenance Efficiency Programme
IMD	Index of Multiple Deprivation
ITS	Institute for Transport Studies
KBIs	Key Benchmarking Indicators
KM	Kilometres
KPIs	Key Performance Indicators
KSI	Killed or Seriously Injured
LAs	Local Authorities

LGA	Local Government Association
LHAs	Local Highways Authorities
LSDV	Least Squares Dummy Variables
LTPs	Local Transport Plans
M2i	Measure2improve
MHCLG	Ministry of Housing, Communities & Local Government
MORI	Market and Opinion Research International
NALC	National Association for Local Councils
NHS	National Health Service
NHT	National Highways and Transport
NIMBY	Not in My Back Yard
NPIF	National Productivity Investment Fund
NRPS	National Rail Passenger Survey
NRUSS	National Road User Satisfaction Survey
NTS	National Travel Survey
Ofgem	Office of Gas and Electricity Markets
Ofwat	Office of Water Services
OLS	Ordinary Least Squares
ONS	Office for National Statistics
ORR	Office of Rail and Road
PCSO	Police Community Support Officer
PFI	Private Finance Initiative
PIs	Performance Indicators
PROMs	Patient Reported Outcome Measures
PTE	Passenger Transport Executive
RDC	Road Condition
RE	Random Effects

RL	Road Length
ROW	Right of Way
RUSI	Road User Satisfaction Index
RUSS	Road User Satisfaction Survey
SCANNER	Surface Condition Assessment of the National Network of Roads
SD	Standard Deviation
SERVQUAL	Service Quality Model
SOS	Send Out Stuff
SQ	Service Quality
SRN	Strategic Road Network
TE	Technical Efficiency
TfL	Transport for London
TLRN	Transport for London Road Network
TOC	Train Operating Company
UA	Unitary Authority
UK	United Kingdom
UKDS	United Kingdom Data Service
WTP	Willingness to Pay
VD	Very Dissatisfied
VS	Very Satisfied

1. Introduction

1.1 Assessing performance and key terms

1.1.1 Performance assessment in England

The assessment of the performance of Local Authorities (LAs) in England is not a recent phenomenon. For example, the decade of the 2000s saw the introduction of Best Value Performance Indicators (BVPIs) and Local Transport Plans (LTPs) (Marsden et al., 2009). The former provided an overall view of performance, so not just highways. As such, BVPIs provided public insight into performance against the BVPIs for all the LAs.

Both BVPIs and LTPs benchmarked LA performance and were known for their use of objective metrics, such as, reduced fatalities (Marsden et al., 2009). These initiatives no longer exist but are useful context on performance assessment back then. Chapter 4 on incentivising satisfaction looks at LTPs in more detail.

The heterogeneity of citizens between and within LAs can mean a large discrepancy in the performance of LAs (Worsell, n.d.). This can make performance assessment of LAs challenging, whether on the basis of satisfaction alone and/or other performance criteria. Performance assessment is related to benchmarking and there exists different types of benchmarking, which are highlighted in Section 2.5 later.

With performance assessment, the key aspect is the move from objective characteristics to become focused on intangible measures, such as, communications and satisfaction. The desire to attain good communications resulted in a move away from the Send out Stuff (SOS) model (i.e., quantity over quality) towards a more customer-centric approach

now adopted by LAs (Worsell, n.d.). This is because the public are perhaps not aware of the extent of funding cuts, that has resulted in substantial scarcity of resources for LAs.

More broadly, there has been the decade of austerity since 2009/10 (Centre for Cities, 2019; Institute for Government, 2022). Since 2010, there has been a 16% reduction in the money available for LAs to spend, otherwise known as their spending power (Institute for Government, 2022). This was exacerbated by the freeze in council tax rises (Localism Act 2011), Covid-19 and the restricted revenue raising power of LAs. With the latter, in 2014, this was 12% locally in England but 17%, 30% and nearly 50% in Italy, Germany and Canada, respectively. Thus, in light of persistent funding cuts, it is useful to consider how LAs can be accountable to the public and this is where public satisfaction comes in.

Yet, the debate about the classification of the public as citizens or consumers persists. The introduction of the DfT (2016) Highways Incentive Fund¹ highlights somewhat that the public/citizens are viewed as consumers and so expect quality public services. Section 2.2 explores whether the public are citizens and/or consumers, as that could affect the assessment of LA performance. With respect to Service Quality (SQ), this is detailed further in Section 2.4 but for now SQ and other key terms will be defined briefly.

1.1.2 Overview of terms used in the thesis

The prior assessment of local authorities and current debate around the public as citizens or consumers raises a broader question of what is understood by local governance. The underlying theme of this thesis is that governance can be viewed differently among the general public. For example, some individuals might emphasise transparency more. In

¹ DfT Incentive Fund and DfT Highways Incentive Fund are used interchangeably throughout to refer to the DfT (2016) incentive scheme.

an international review, local governance is deemed to have three key facets that are generally emphasised: power/rights, local decision-making, and accountability (Scottish Government, 2021). In this thesis, local governance exists outside of central governance and is characterised by accountability, making difficult/complex decisions and exercising authority. As such, local governance is linked to public satisfaction and related aspects.

The key concepts of satisfaction, service quality and efficiency are all now defined in general terms. Ipsos Market and Opinion Research International (MORI) state satisfaction is the gap between a person's expectation of a phenomenon and reality (what they receive) (Ipsos MORI then MORI, 2002). Service quality arises from P(erformance) minus E(xpectations) or P - E (Parasuraman et al., 1988). That is, satisfaction is relative to expectations and service quality is about an overall quality. Efficiency is attained when the cost is at a minimum, without compromising on the level of attainable service quality or satisfaction. These key terms are detailed in Literature Review I (Chapter 2) to provide background/context and recognise they are not definitive.

Before providing the background to highways in England, it is helpful to consider what is meant by highways in England. For example, Wheat and Pinkney (2013) focus on roads maintenance, street lighting and winter maintenance. For this thesis, a broader definition of highways is adopted that encompasses structural aspects (roads, pavements, public footpaths and cycle lanes) but also ancillary aspects (street lighting, drains, road signs, gritting and road verges). Note, a road verge consists of grass/plants and/or trees and separates a carriageway of road traffic from another carriageway and from the footway.

1.2 Research motivation and background

1.2.1 Motivation and highways background

Considering the reach and importance of local highways, the motivation for this research is three-fold. Firstly, the issue of accountability and to what extent the local highways authorities should be accountable for satisfaction, over and above other means of accountability. Secondly, the role of incentives in ensuring value for money to benefit local citizens. Finally, the progressive move away from minimising costs to maximising the life/quality of highways assets, which means satisfaction might be a useful measure to capture these aspects of value. That is, optimisation based on considering the life of assets rather than just initial asset costs.

There are clearly many possible measures of the value of highways. One key factor is the extent to which the public perceive value through their revealed satisfaction based on surveys. This thesis is concerned with the role of public satisfaction at different levels of governance. Three perspectives (incentivising, perception and influencing) will be taken, which together contribute to the debate on the extent to which public satisfaction (and citizen involvement more broadly) should be used in public policy decision making. This is explored in Section 1.3 on the benefits of considering public satisfaction with local highways. Prior to this, the rest of this Section 1.2 provides context on England highways with respect to its funding arrangements and its somewhat unique governance structure.

Highways are a part of the varied public services that local governments provide. Public services are far reaching and encompass highways, schools, libraries and other key services (Berman, 2008). The Highways Act 1980 sets out the responsibilities for local highways authorities in the United Kingdom (UK). This Act sets out responsibilities, such as, for local highways maintenance (UK government legislation, n.d.). The Act comes

from Parliament (a legislative body) and applies to only England and Wales roads in the UK.

In England, by road length in Kilometres (KM), the majority of the road network falls under the responsibility of local highways authorities (DfT, 2021). Of the 189,700 miles of road length in England in 2020, only 2% of it consisted of trunk roads and motorways, which forms a Strategic Road Network (SRN). The other 98% are local roads that are hierarchal in nature and classified as A, B, C or U (Unclassified) roads, with the majority being rural (House of Commons, 2019). The local road classification for the England Local Road Network (ELRN) from the House of Commons (2019: 6) is the text box below (Figure 1).

“The roads within the ELRN fall into the following four categories:

1. ‘A’ roads – major roads intended to provide large-scale transport links within or between areas.
2. ‘B’ roads – roads intended to connect different areas, and to feed traffic between ‘A’ roads and smaller roads on the network.
3. Classified unnumbered – smaller roads intended to connect unclassified roads with ‘A’ and ‘B’ roads, and often linking a housing estate or a village to the rest of the network. Like ‘minor roads’ on an Ordnance Survey map and sometimes known unofficially as ‘C’ roads.
4. Unclassified – local roads intended for local traffic. By length, most roads fall within this category.”

Figure 1: Classification of local roads in England

Outside of local roads, the SRN is overseen by National Highways (previously Highways England). National Highways (n.d.), in their own words, “manage and improve England’s motorways and major A roads, helping our customers have safer, smoother and more reliable journeys” (ibid, n.d.). The National Highways are government owned, with a shareholder (DfT) who they work with to maximise impact. National Highways is not to be confused with the National Highways and Transport (NHT) survey that assesses

satisfaction with LAs. In the governance section (next), the focus is on local governance, that is most pertinent to this thesis, rather than National Highways or the SRN.

1.2.2 Local highways funding in England

The focus of this section is on the various sources of highways funding that are available to LAs from the DfT. The rationale for providing background to local highways funding is to provide information on where the DfT (2016) Incentive Fund fits in to an overall funding structure in England. Section 3.5 provides the background to the DfT (2016) Incentive Fund, which is analysed in Chapter 4. Note, London is unique in its funding as it receives no funding from central government and is instead funded by Transport for London (TfL).

The allocation of funding for local highways raises questions about the potential widening performance gap. In other words, if funding is allocated based on the Road Length (RL) in KM that LAs oversee then do larger LAs perform 'better' due to receiving more funding? There is potential then for a performance gap to become larger over time.

The main source of funding for local highways in England is capital funding (the Needs Fund) that is based on RL (Kemp, 2017). The name is misleading as it implies the money goes where it is needed most. However, the Needs Fund is based on RL alone, rather than performance, but a change in RL often occurs due to factors outside LA control (DfT, 2021). For example, roads that come with new housing or permanent road closure.

The Figure below shows the main source of funding for LAs, the Needs Fund, and other sources of funding from central government in £millions (in money not real terms) (Kemp, 2017). LA highways government funding between 2008/09 to 2014/15 was solely from a

need formula (i.e., the Needs Fund), as shown in the chart below (ibid: 15). Annually, the Needs Fund, across all highways LAs, consists of around £800 million (+/- £100 million).

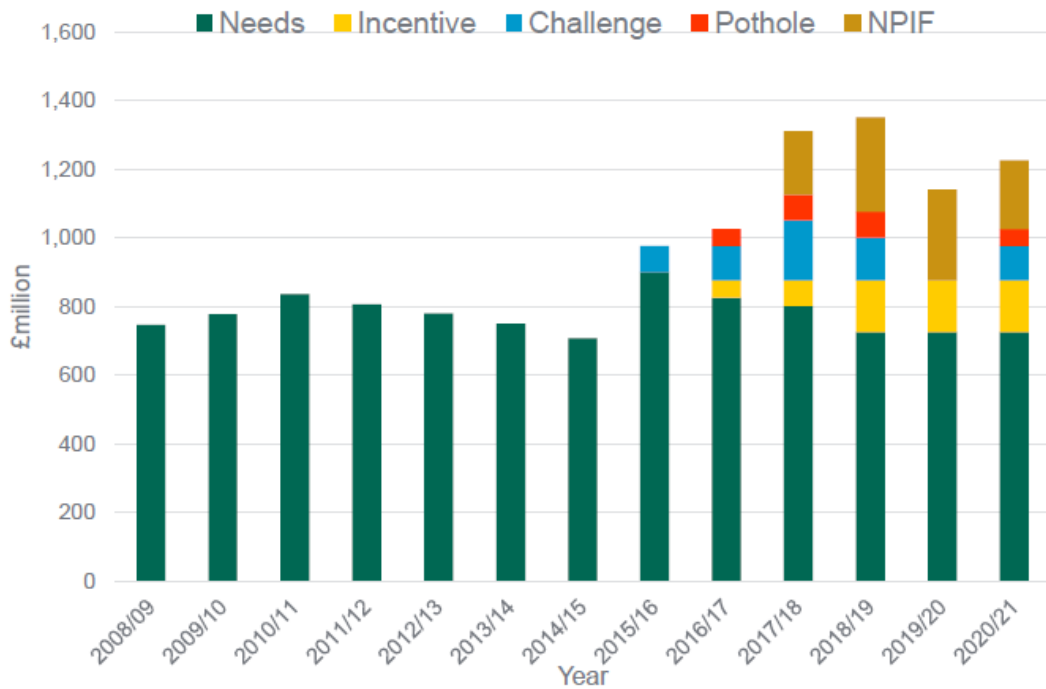


Figure 2: Sources of funding for local highways authorities.

Prior to the DfT (2016) Incentive Fund, 2015/16 funding comprised of the Needs Fund and the Challenge Fund only (Kemp, 2017). From 2016/17, highways funding is made up of the Needs Fund, Challenge Fund, Incentive Fund, and Pothole Action Fund. There is also the National Productivity Investment Fund (NPIF) that aims to tackle barriers, such as, congestion, to yield economic productivity/growth. In addition, there is the Safer Roads Fund and an Access Fund (to replace the Local Sustainable Transport Fund).

The DfT Incentive Fund allocation is £578 million in total across the years (Kemp, 2017). The amount rises with £50 million in 2016/17, £75 million in 2017/18 and £151 million each from 2018/19 to 2020/21. The table below summarises the allocation of highways

funding, which is illustrated in the Figure above. Some LA funding requires a competitive bidding process, with the remainder funding being allocated based on a specific formula.

Table 1: Overview of highways funding

Fund name	Description	How allocated
Needs Fund	Accounts for network size to distribute the DfT funding for Local Highway Authorities (LHAs)	Needs formula
Challenge Fund	Excludes lighting scheme and used to bid for projects not possible to fund using Needs Fund	Bidding process
Incentive Fund	Self-assessment with 3 Band outcomes (1, 2 or 3) £578 million in total	Formula (Band determines %)
Pothole Action Fund	£250 million from 2016 to 2021 to target potholes	Formula
NPIF	£1.1 billion – housing, growth and tackling barriers that impede growth of productivity	Bidding process

Source: own summary of Kemp (2017).

The Needs Fund block of funding is based on the formula below, where element refers to roads, bridges, street lighting, cycleways and footways (DfT, 2014: 1). The allocations are aggregated and then rounded to the nearest £1000 to provide an overall needs fund for each LA (DfT, 2014). It omits Sheffield, Birmingham and Isle of Wight as those LAs that are funded by a Private Finance Initiative (PFI) and it also does not factor in LAs with street lighting PFI. London boroughs (being unique), and Isle of Scilly are exempt.

$$\left(\frac{\text{LA total for each element}}{\text{England total for each element}} \right) \cdot \text{Total allocation in } \pounds \text{ for each element} \quad \text{Eq. 1}$$

The chart below shows the breakdown of the Needs Fund (own summary of figures from DfT (2014:1)). 75% of the Needs Fund is split equally among distinct road types: A roads, B and C roads, and U roads. This is based on DfT RL data and covers rural and urban roads with data on bridges and lighting from LAs. Right of Way (ROW) that are open to the public anytime, such as, bridleways are excluded from this Needs Fund calculation.

Breakdown of Needs Fund

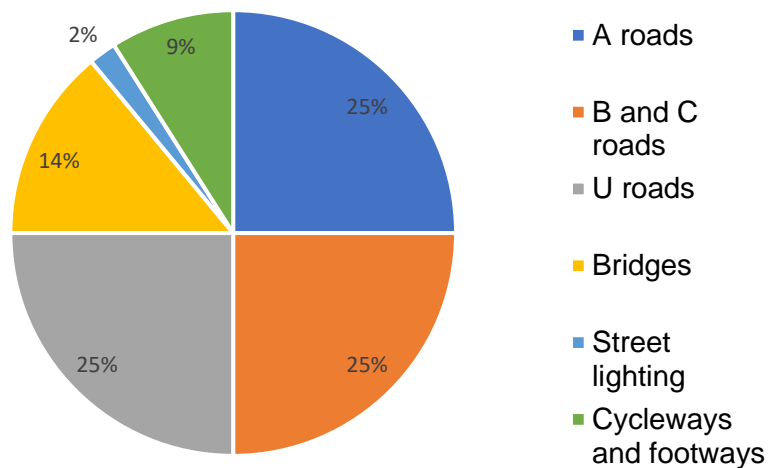


Figure 3: Breakdown of DfT Needs Fund.

This discussion has illustrated that the vast majority of local highways funding in England is from the Needs Fund. The issue with the Needs Fund is its allocation of funds among LAs based on their road length in KM. That is, an allocation based on a formula and not based on the performance of LAs. The DfT (2016) Incentive Fund was then introduced alongside and provided ring-fenced incentive funding to reward better LA performance.

1.2.3 Overview of governance in England

This sub-section provides an overview of governance in England. This thesis looks at both central governance and local governance. Therefore, as a starting point, it is useful to look at the terms of local governance and how they are commonly used.

LAs are commonly referred to as local authorities or local councils when talking about the citizens (see, for instance, LocalGov, 2022) but as principal authorities in some of the local governance literature. However, within this thesis and in line with the local governance literature, local councils is the official collective term for parish and town councils (grassroots governance). Thus, local authorities, LAs, local highways authorities, LHAs and highways authorities are used to denote principal authorities. Apart from the last two chapters where principal authorities itself is used, to avoid confusion with the local councils that are explored in Chapter 6 and then mentioned in Chapter 7.

The Local Governance Association (LGA, n.d.) is a representative voice nationally for local authorities. In terms of local governance in England, local authorities are either single tier or two tier. The former are known as unitary (one tier) authorities as they provide all the local services. There are 59 unitary councils, 33 London boroughs and 36 metropolitan boroughs in the single tier category in England. Whereas two tier authorities are known for dividing local services between them. Of the two tier authorities and in numbers, there are 24 county councils and 181 district, borough or city councils in England. The type of local authority that someone resides in depends on where they live.

Following new legislation in 2009, there is a new type of authority: combined authorities (LGA, n.d.). A combined authority consists of two or more local authorities that jointly make local decisions. In terms of some examples of combined (regional) authorities, they include West Yorkshire Combined Authority or Greater Manchester combined authority.

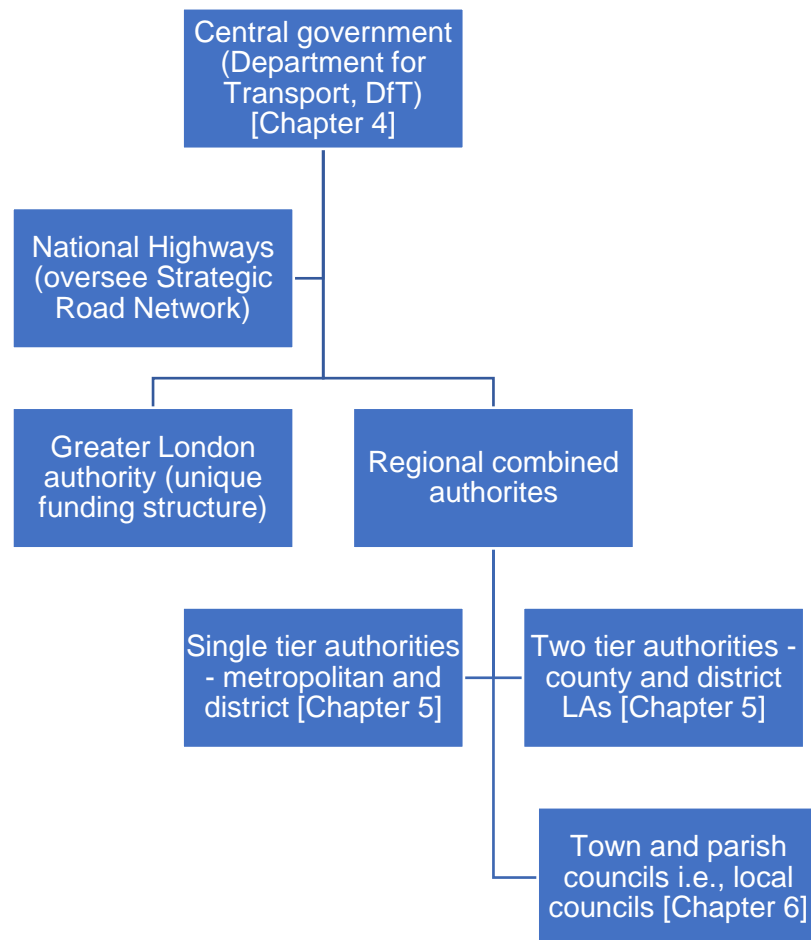


Figure 4: Governance structure of highways in England

The overall governance structure of England is seen in Figure 4 above. At the top (central governance) level, there is the DfT. The DfT is a ministerial department that works with National Highways (formerly Highways England), LAs and other partners to keep Britain moving. The lowest governance level is parish and town councils i.e., local councils, though not all areas in England have local councils. Chapters 4 to 6 will, in turn, consider

a governance level within England and its role with respect to assessing satisfaction with the ELRN. The Figure above illustrates the governance structure/hierarchy for highways in England, which is an own summary of various sources cited to date in this sub-section.

In relation to the middle tier of LAs, this is perhaps the most varied of governance levels (Studdert, 2021). There are different types of LAs in England, as in Appendix 1 and the Figure above, and each LA type has a slightly different governance structure. The main distinction is whether an LA is a single tier or two-tier council. A single-tier LA handles all the local government functions and is either metropolitan boroughs, Unitary Authorities (UAs) or London boroughs.

However, two-tier LAs share the responsibility for local governance functions (Studdert, 2021). A two-tier LA has both a county council (upper tier) and district council (lower tier). The former provides mostly strategic oversight with responsibility for services, such as, transport and public health. Whereas the latter are mainly responsible for place services, such as, housing and planning.

1.2.4 England governance: distinct features

The previous section set out the governance structure for England. Appendix 2 compares England to some other well-functioning governments by drawing upon an international review for the Scottish Government (2021). Although the case study countries in their review were chosen for comparability to Scotland, Appendix 2 still provides context. It does this by highlighting how local governance structure in England differs or is similar to the case studies of these selected countries.

While other countries have grassroots governance (see Scottish Government, 2021), only parish councils in England possess the power to raise their own revenue. In addition, members of parish councils are elected, and parish councils are not universal across England. Thus, to the best of the researcher's knowledge, these features of parish councils in England make them unique. More broadly, the distinct nature of England governance allows for exploration of highways via the DfT (2016) Incentive Fund, LAs and parish councils, which is a research contribution.

Although some other countries have a distinct number of levels (Scottish Government, 2021), there exists variation in England local governance. In England, both two-tier and one-tier governance exist alongside (in some areas) combined authorities (akin to a large third level) and parish or town councils (seen as a small fourth level). This means that, there is a need to recognise the dynamic nature of local governance, generally, but also the horizontal and vertical relationships present between central and local governments.

A commonality across the countries in Appendix 2 was how local governance largely remained unchanged during the 19th century (Scottish Government, 2021). In addition, the current local governance is influenced by what came prior and later reforms. For example, the first past the post system in England for the election of the local councillors.

There are also variations in population size (Scottish Government, 2021). Notably, some countries have fewer than 10 million people, but England is much larger. For example, in 2020, England had a population of 56.3 million. In relation to population size, attention is now given to the benefits of considering satisfaction in relation to travel/local highways.

1.3 Benefits of considering satisfaction

The public are stakeholders given that “the delivery of transportation improvement is in the eye of the beholder – the public” (Pinkney and Marsden, 2013: 2). The challenge is not just wise allocation of a limited budget to meet policy goals but also fulfilling public desires so that improvements do not go unnoticed nor unappreciated. In other words, deliver what the public want whilst considering broader policy and long-term views, such as, sustainability and long term asset management. An issue of funding constraints means that accounting for public satisfaction within transport is vital. As such, heightened importance is placed on the best use of public funds.

The tangible measures of physical assets, such as, road condition from the DfT, that exist in transport do not effectively communicate best value to the public (Pinkney and Marsden, 2013). In contrast, public satisfaction and customer-oriented performance measures underpin benchmarking, help to justify transport investments, and are often presented in a way that allows the public to see the performance over time. For example, this is the case with NHT satisfaction results as the public are encouraged to generate their own reports to assess LA performance. This introduces an element of accountability perhaps not seen with road condition alone. Public satisfaction also highlights the need for consultation to meet desires through investment if it is identified as a priority. That is, satisfaction eliminates the guesswork for needs and preferences of the general public i.e., informed decision making. A key part of local governance, as highlighted earlier, was a need for local decision-making. Hence, public satisfaction plays a key role in decisions.

Suanmali et al. (2015) look at the Inter City Motorway Division in Thailand and posit that there are several benefits to increasing satisfaction: competitive advantage, improve infrastructure for logistics and maximise efficiencies to promote tourism. Hence, there is

a need to consider public satisfaction to know what public priorities are, allocate budget wisely and increase knowledge of the influence of public satisfaction. Similar to many government organisations, the highways department have a funding shortfall. Thus, public satisfaction identifies first and foremost the areas to make better. This is viewed as an effective way to make use of a constrained budget.

Another reason to consider public satisfaction is the heterogenous nature of individuals. As Poister and Thomas (2011) note, different groups will be more or less easily satisfied. That is, the same level of service quality will have different (dis)satisfaction results depending on the individual. The assessment of public satisfaction has also identified the role of expectations, which can have perverse incentives as public managers may over-manage expectations to such an extent that expectations are lowered. This implies it is important to measure public satisfaction and/or measure expectations to assess if public services are improving, and whether or not unrealistic or high expectations exist.

This sub-section has highlighted the challenges that all LAs (and more broadly public services in England) face. These challenges include, but are not limited to: funding shortfall, the heterogeneity of citizens and how to effectively communicate best value to the public. Such challenges are not specific to England but apply internationally when considering satisfaction with local highways. An additional challenge is weather, which may be more pertinent in England. A bad winter will negatively affect road conditions and put increased pressure on already limited funds and resources. Having motivated the need to consider satisfaction, the thesis/research aims and objectives are now outlined.

1.4 Research aims and objectives

The overall research aim is to investigate how different levels of governance play a role in influencing public satisfaction with highways. In turn, the research chapters cover central government (DfT), local authorities in England and grassroots governance via a pilot study of some parish councils in Leeds. This will help inform better decision making whether incentivising LAs (Chapter 4), looking at how perception influences satisfaction (Chapter 5) or engaging the public effectively at a grassroots (parish) level (Chapter 6).

The overall thesis is underpinned by three research objectives as follows:

- How should funders incentivise an array of measures from quality assets to customer satisfaction? More specifically, to determine the relationship (if any) that exists between the DfT highways Incentive Fund and given highways measures [Chapter 4]
- Does public satisfaction respond to asset conditions changes or is this not perceived? More specifically, to investigate whether or not the public perceive good local highways asset management and the implications of this [Chapter 5]
- What roles do different levels of governance play in influencing public satisfaction? More specifically, to understand (better) the extent to which parish councils can impact on satisfaction with highways by engaging citizens [Chapter 6]

Some of the previous satisfaction research has explored the impact of confidence and trust in local government (see, for example, Page et al., 2015). But an emphasis on the perception of government and not the perception of quality can mean that efficiency, not satisfaction, is then seen as the way forward. However, this means the impact of different levels of governance and how they interact to influence satisfaction is overlooked. This then forms the overall significance and contribution of this thesis.

In order to address the overall research aim, the researcher has access to unique data on local highways. This is a potential contribution that makes this thesis significant. The significance of this unique data lies in a) its coverage of most of England to provide context on variations among local authorities, b) the level of detail and robust data on satisfaction, efficiency and quality, and c) a large dataset that spans a number of years that aggregates responses from multiple respondents into one metric. This then provides consistent measures to allow for benchmarking between or within authorities and over time. Thus, these aspects of the dataset allows for a unique opportunity to explore the role of public satisfaction within the governance of local highway authorities in England.

1.5 Overview of thesis chapters

Following this introduction chapter, the structure of the remainder of this thesis is as follows. Chapters 2 and 3 are literature review chapters that cover relevant concepts and methods and key data respectively. There are then three research chapters that look at satisfaction and the role of different levels of governance, namely, the DfT (Chapter 4), LAs (Chapter 5) and parish councils (Chapter 6). Finally, Chapter 7 concludes this thesis.

1.5.1 Chapters 2 and 3 – literature reviews

In terms of overall structure, both the generic literature and data sources that underpin the whole thesis are contained in the next two chapters. Whereas the specific literature on incentivising performance, perception of public satisfaction and citizen participation are within Chapters 4, 5 and 6, respectively. The rationale of this is to position only the most relevant literature review in the research chapters themselves, but with signposting to allow links to be made between the different chapters with literature reviews in them.

Chapter 2 summarises satisfaction and performance benchmarking literature for various sectors to better understand what could influence satisfaction with highways. These factors can be divided into the internal and external determinants of satisfaction. For example, communications with the public is internal whereas expectations influenced by demographics are external i.e., inside or outside LA control respectively. Thus, Chapter 2 aims to equip local highways authorities with knowledge on perception in relation to highways satisfaction, so LAs can improve satisfaction. The second half of Chapter 2 is an overview of the quantitative and qualitative research methods executed in this thesis.

Chapter 3 provides an overview of the relevant quantitative data sources for this thesis. These data sources are all highways specific with the background for each found in this second literature review chapter. This involves summarising other road user satisfaction surveys to gain learnings on the method and assessment of public satisfaction. The three core research chapters then follow Chapter 3.

1.5.2 Chapter 4 – incentivising satisfaction

Section 1.1 highlighted BVPIs and LTPs as prior examples of performance assessment for LAs. These were characterised by the use of objective metrics, which is absent from the DfT (2016) Incentive Fund. The move towards customer-oriented performance helps motivate this research chapter on the Incentive Fund. This work, in turn, informs future highways incentive frameworks by asking if good process alone leads to good outcomes.

As such, Chapter 4 explores how best to incentivise local highways authorities to ‘deliver’ on public satisfaction. In order to do this, the first research chapter draws upon unique benchmarking data from the NHT Network satisfaction survey and the Cost Quality

Customer (CQC) efficiency framework. The results indicate whether or not a relationship exists between the DfT (2016) Incentive Fund questions and certain highways aspects.

The literature review in Chapter 4 draws parallels with LTPs and draws upon other incentive schemes to explore performance incentives. The learnings from these other performance schemes implies metrics are a key component of performance. Whereas the DfT (2016) Incentive Fund seems to be more ticking a box, rather than whether or not it is done well; there is an absence of targets or performance goals.

There is also the related sub-question of whether or not the playing field is level: do larger LAs score higher on the Incentive Fund, compared to small LAs? As the DfT Incentive Fund differs from past performance schemes, the question is if it can 'work' to incentivise LAs, but there was no evidence of this. The contribution of Chapter 4 is the first known analysis of the DfT (2016) Incentive Fund.

1.5.3 Chapter 5 – perception of satisfaction

Chapter 5 assesses whether or not the public respond to 'better' road conditions by reporting higher satisfaction. There exist numerous ways to measure satisfaction and related aspects, such as, quality. The starting point for Chapter 5 is the explicit equation for satisfaction proposed by Roch and Poister (2006), which will be applied in Chapter 5.

Further, Chapter 5 contributes to the perception vs satisfaction literature by looking at the perception of local highways in England. It contributes to the literature on whether or not demographics impact on satisfaction. The literature review in Chapter 5 explores what is being measured with 'satisfaction', such as, wellbeing, quality of life and similar.

It has been found that the public not only perceive road conditions but also change in road conditions. Age or gender alone have little impact but considering, for example, young males there is a statistically significant relationship between demographic variables and satisfaction. In this thesis, demographic data (from the Office for National Statistics (ONS)) proxies for expectations.

1.5.4 Chapter 6 – influencing of satisfaction

Chapter 6 looks at the contribution of grass-roots level governance, namely, parish councils. As parish councils are the lowest government tier i.e., closest to the public, they potentially play a role in influencing satisfaction with local highways. Chapter 6 examines if this is the case by drawing upon Arnstein's (1969) model as the starting point of citizen involvement, but the focus is on a critique and developments of Arnstein's seminal work.

In addition, the final research chapter (Chapter 6) looks at the role of parish councils but for local highways specifically so contributes to the parish literature. This research chapter focuses on the geographic area of Leeds in West Yorkshire. The pilot study implies that effective local engagement can be vital for influencing public satisfaction with highways, implying one way communications alone is insufficient. The semi-structured interviews allowed for an in-depth insight into the role of parish councils within highways.

Chapter 7 draws together all the aforementioned research chapters to yield conclusions. The conclusion chapter covers the key findings on satisfaction with highways, research implications and the future research needed in an area often focused on efficiency alone. The conclusion chapter considers the important role of the different levels of governance.

1.6 Summary

There are commonalities and differences across the three research chapters in this thesis. The commonalities are as follows: research underpinned by satisfaction, looking at highways from the perspectives of users and applying research from beyond transport to the assessment of satisfaction. This latter aspect is Roch and Poister's (2006) explicit equation of satisfaction and the (critique of) Arnstein (1969) for local citizen engagement.

Whereas the differences lie in three main areas as follows. The role of different levels of governance, namely, central government (DfT), local government (LAs) and grassroots parish governance, in relation to satisfaction with highways in England. The approach to public satisfaction also differs (incentivising in Chapter 4, perception in Chapter 5 and influencing via effective communications in Chapter 6). There also exists variation in data and method, as explored in Chapter 2 and 3, then each of the three subsequent chapters.

2. Literature review I: relevant concepts and methods

2.1 Introduction

This is the first of the two literature review chapters in this thesis. In this literature review chapter, the generic literature and methods that underpin the thesis are covered here to provide background before the research chapters. The more specific literature on use of incentives, broader satisfaction measures and citizen participation are found in Chapters 4, 5 and 6, respectively.

This literature review chapter is split into two parts: relevant concepts and methods. The first part details relevant economic concepts for this thesis. To better understand these concepts, this literature review looks at the transport sector and beyond. This chapter draws upon the satisfaction literature as well as the wider benchmarking, performance and efficiency literature.

The second part of this chapter outlines the methods used to answer all the research objectives. These methods are econometric (regression) method and qualitative (semi-structured interview) method. This translates to two quantitative research chapters and one qualitative research chapter. In terms of the specific execution of the methods, this is detailed in the Methodology section of each of the respective research chapters later.

2.2 Satisfaction

With satisfaction being central to the thesis title, aims and objectives, it is appropriate to begin this chapter on relevant concepts by exploring what is meant by satisfaction. This is satisfaction generally, and not satisfaction with local highways. Although, it is evident the latter is the focus of this thesis on highways.

2.2.1 Defining and assessing public satisfaction

Satisfaction is generally defined as the gap between a person's expectations and the reality (Ipsos MORI then MORI, 2002; Stradling et al. 2007). Ipsos MORI (then MORI, 2002) make a distinction between customer satisfaction and citizen surveys. The latter explores issues, for example, what falls (and does not fall) under the remit of public services i.e., what should public services offer? Whereas the former is less about 'this is what should be provided' and more about service or operational aspects, such as, responsiveness and service quality. The latter concept is detailed further in Section 2.4.

Yet, if adopting a commercial view, customer satisfaction is the subjective gap between desired service levels and the reality (Stradling et al., 2007). In other words, satisfaction is ascertained from the difference between perceived and expected service. Thus, high (low) satisfaction occurs when customer expectations of the service level are surpassed (unfulfilled) (Ipsos MORI then MORI, 2002). Hence, expectations play a role, and their role is considered further in Section 2.3.

Further, the literature distinguishes between overall satisfaction and satisfaction with a given aspect. For example, an encounter satisfaction is about satisfaction in the moment. This is driven by a service encounter: "that period of time during which the consumer and service firm interact in person, over the telephone, or through other media" (Bitner and Hubbert, 1994: 73). Hence, service encounter satisfaction relates to a specific event and is the 'moment of truth'. The latter stems from the view that each service encounter is a chance for firms to reiterate their standards for customer satisfaction and service quality.

Therefore, a distinction between overall satisfaction (global perception of a firm) and encounter satisfaction (specific view of a service encounter). Nevertheless, it is then a series of positive (negative) 'encounters' that manifest into an overall high (low) satisfaction with organisations (Bitner and Hubbert, 1994). In this thesis, satisfaction is an (overall) satisfaction throughout, and not an encounter satisfaction or satisfaction with a given aspect, unless specified otherwise.

Having defined satisfaction, the question then is about how satisfaction arises. There are two schools of thought that cover either anticipatory SQ and experienced SQ in relation to satisfaction (Ipsos MORI then MORI, 2002). One school of thought is that satisfaction precedes SQ. Whereas the other school of thought is that SQ precedes satisfaction. In other words, do people expect high satisfaction and view SQ in light of that or do people experience an SQ that then influences their satisfaction, respectively? These two schools of thoughts are shown below (own summary based on Ipsos MORI then MORI, 2002:5)).

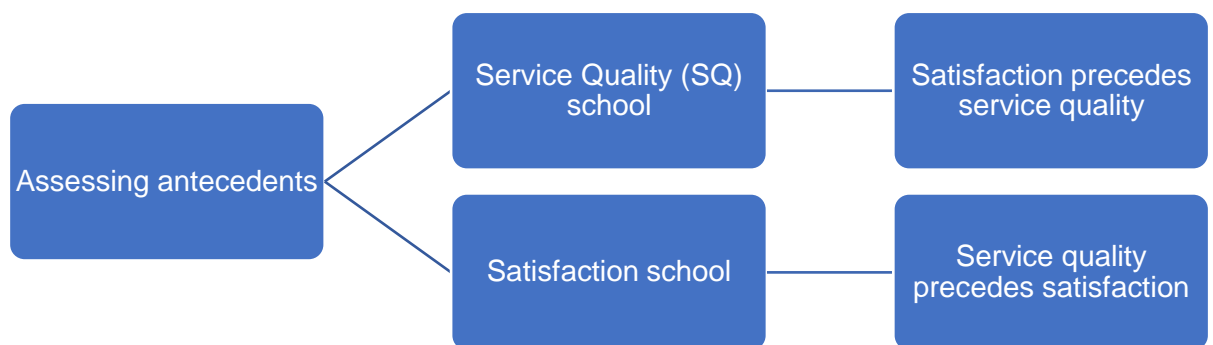


Figure 5: Satisfaction and two schools of thought

The inter-relationship between quality and satisfaction (highlighted in this sub-section to date) while valuable can be misleading as it posits a straightforward A to B relationship between quality and satisfaction. That is, all local authorities need to do is to improve

quality in order to improve their satisfaction scores. The remainder of this sub-section briefly looks at the psychology of satisfaction to explain why it is that individuals perceive the same quality differently, which affects satisfaction.

Abelson (1989) puts forward the view that people are possessive of their beliefs, which is emphasised by a furniture analogy. Although you may acquire new furniture, this accumulation can come with a caveat that it 'fits in' rather than being out of place. The reasoning is that humans are reticent to change and have a comfort zone whether that is the tangible furniture or their beliefs. Also, in relation to beliefs, Giese et al. (2001: 62) posit that beliefs (in their case of pavements) are an intermediary component between physical (objective quality) characteristics and (subjective) satisfaction, as shown below.

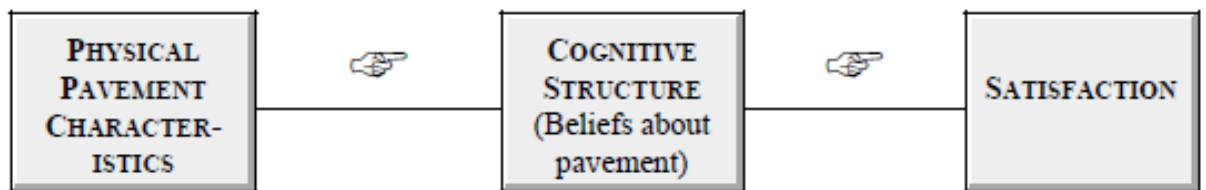


Figure 6: Intermediate role of beliefs in satisfaction

This highlights the importance of subjective satisfaction for this thesis. The significance of the work of Giese et al. (2001) is it helps to explain why the same road conditions are perceived differently by individuals. Thus, it directly motivates the suggestion that people perceive physical characteristics, with perception of roads in relation to satisfaction being explored in Chapter 5. However, the link between road conditions and satisfaction are not a direct relationship. Thus, it is not clear if quantitative models will be able to pick up on intangible beliefs. While beliefs are akin to furniture that rarely changes, expectations can differ according to the service (such as, highways vs schools), time of day and mood.

Confirmation bias is a form of bias where people look for and notice what supports their view (Allahverdyan and Galstyan, 2014). Someone who thinks their local authority is not doing well may exhibit bias in wanting to confirm their perception. That is, greater weight will be attributed to the information that fits in (i.e., confirms) a person's existing beliefs and opinions. While confirmation bias is not used for this thesis, the proxy of community attachment is. The implication of community attachment is that people more attached to their community will perhaps hold LAs to an unrealistic standard. This may mean more weight is placed on communications (such as, complaints) that support a perception of 'failure'. This leads on to the next sub-section on the heterogeneity of public satisfaction.

2.2.2 Assessing satisfaction given heterogeneity

The heterogeneity of public satisfaction is inferred by Robinson and Kuemmel (2004). Is a comparison of Local Authorities (LAs) valid when the public within an LA have different priorities to each other? For example, the public may agree that repairs should occur more quickly but whether they want to pay through increased taxes and/or work occurring outside standard working hours (of weekdays 9am to 5pm) are potential issues in relation to this. There can be a discrepancy between what the public want and their Willingness to Pay (WTP) (Pinkney and Marsden, 2013).

It is also perhaps worth considering equity. Whilst, for example, safer roads are around 70% importance in public surveys for East Midlands, London, North East and South West (Pinkney and Marsden, 2013), this masks income differences. A Campaign for Better Transport report notes that "children of the lowest socioeconomic group are 28 times more likely to be killed on the roads than those of the top group" (Bourn, 2012: 11).

Therefore, from an equity viewpoint, safer roads are clearly of utmost important for the poorest children in the aforementioned regions in England.

There has been an emphasis on the need to consider multi-dimensional benchmarking (Wheat and Pinkney, 2013) but a part of that may be about recognising the multi-dimensional impact of transport (Naimanye and Whiteing, 2016). Is it measuring public satisfaction or only satisfaction of the most fortunate? If the latter, then this is problematic due to the perpetuation of inequality. For example, Martens (2016: 31) proposed a cycle where the demand for cars/road systems leads to increased road maintenance and the provision of new routes. This means there is greater demand for road travel (hence, more maintenance/expansion that persists). Thus, it is proposed long-term allocation of funds can mitigate poverty by accounting for multi-dimensional poverty and local needs meaning rural roads are not overlooked (Naimanye and Whiteing, 2016). Rather than being about political benefit or population density. Their research could apply to England.

The existence of a given budget in the public sector means that different groups with varying priorities are in competition for increasingly scarce resources (Kouzmin et al., 1999). From a WTP viewpoint, there is the user pays principle though this has equity implications for vulnerable groups. Therefore, “a certain degree of insensitivity to consumer demands is positively desirable in order to protect the interests of those vulnerable consumers” (ibid: 122). This implies that performing ‘well’ is not solely about prioritising the majority and views should be weighted, given the variations in satisfaction.

The importance of weighting public views is highlighted by non-users who felt their input was probably not as worthwhile due to a lack of experience and/or knowledge (Forsyth and Smyth, 1986). The implication of this is quality of services may be biased towards

the majority with less used routes having less precedence. In relation to highways, the implication of this is that investing in ROW or cycle lanes may not be viewed as a priority (Pinkney and Marsden, 2013).

2.3 Expectations

Expectations can be viewed as multi-faceted, given that individuals possess different expectations for various attributes (Pinkney and Marsden, 2013). For instance, tangible measures, such as, highways conditions and softer measures, for example, clear communications. Whilst there is not an objective or standard expectation variable, it is possible to look at variables for which expectations exist (Poister and Thomas, 2011). From these expectations, the factors that influence satisfaction can then be determined.

Previous research has found that expectations have a positive, minimal, or negative impact on satisfaction. Poister and Thomas (2011) posit that these differences exist due to the definition of expectations used. Or rather, whether SQ is an antecedent to satisfaction or vice-versa. In essence, the two schools of thought covered in the Introduction chapter. Do people have preferences for what is good SQ that then influences satisfaction? Or do people experience (dis)satisfaction that then means they have a given desire of anticipated SQ? Therefore, there exists normative expectations and predictive expectations, respectively. In terms of the latter, for example, motorists when commuting generally travel on certain roads at their usual time, and so predictive expectations in terms of congestion tend to match reality - that is, realistic expectations.

Recall that satisfaction is the gap between expectations and reality (Ipsos MORI then MORI, 2002). Thus, higher normative expectations are challenging to attain in reality, which leads to reduced satisfaction (Poister and Thomas, 2011). In other words, as

people expect higher quality, there is an increased likelihood of lower satisfaction. Whilst normative expectations may not match the reality, this means they can provide greater insight into public satisfaction than predictive expectations. Normative expectations depict what SQ should be as opposed to predicted SQ/performance. Although there is not an expectation variable, normative expectations can still be measured using surveys.

There is a decision to be made in terms of how to ascertain expectancy disconfirmation. Either individuals compare expectations to performance where performance matches, surpasses, or fails to meet expectations (Poister and Thomas, 2011). Or expectancy disconfirmation is the gap between perceived performance minus expectations. Regardless of the measure chosen, the result is either good (performance > expectations) or negative (performance < expectations).

For this sub-section, the focus has been on heterogeneity of expectations for individuals. Outside of individual expectations, it is recognised that heterogeneity can occur at an LA level. For example, LAs receive different amounts of funding and oversee different sizes of the road network. As such, Chapter 4 on incentives explores whether this is a level playing field. Also, Chapter 5 on perception involved executing Random Effects (RE) to control for the differences in land area between LAs that were unchanged throughout the years of analysis that were considered in that chapter.

2.3.1 Managing expectations

With customer satisfaction, a business oriented (commercial) mindset depicts an aim to match (or even exceed) expectations (Ipsos MORI then MORI, 2002). However, if the public are categorised as users of highways (i.e., not customers) then managing expectations plays an important role. That is, the public are not 'customers' so education

by LAs on what is feasible can improve public satisfaction as the public (and DfT) realise what is 'good' vs overly stringent (DfT, 2016). This leads well onto the next paragraph on trust, in relation to expectations.

There is a tendency for expectations to be skewed depending on the trust placed in authorities, that is, it may be positive or cynical (Robinson and Kuemmel, 2004). However, it could be argued that being cynical of LA performance is due to more informed views. Economists recognise that information gathering takes time. This means that some members of the public will be less informed than others, which affects their view of what is the 'right decision' i.e., bounded rationality (Arthur, 1994). Therefore, those that are less informed (due to search costs) may have unrealistic expectations and so may never be happy, which makes it challenging for LAs to manage or meet the expectations of everyone to deliver on satisfaction.

While the dataset available does not cover expectations, one potential measure for the differences in expectations is what is referred to as a community attachment variable. In this research, the community attachment variable is registered voters. The expectation is that if someone is registered to vote, they are likely to be more involved in the local community and so have more realistic expectations. This is why information provision combined with educating citizens is important to overcome bounded rationality (see Arthur, 1994 for this term) and yield realistic but still good levels of expectations. By bringing this information to the public, the issue of search costs is mitigated to a certain extent, as individuals are not expected to find or ask for key local information themselves.

2.3.2 The role of transparency

It is noted that transparency, communications, and public engagement can positively affect public expectations (Berman, 2008). If the public are more aware of the challenges faced at a government and local level, then they be more sensitive to budget resources. Hence, there is an element of educating the public.

For example, the LGA (2016) oversee an annual campaign to encourage local authorities to showcase what they do by using hashtag 'OurDay' on Twitter. On the day, LAs provide real-time insight into what they do throughout the day beyond fixing potholes and bin collection. This insight of work undertaken by LAs is about highlighting the breadth (for example, social care) and magnitude (such as, the number of bins emptied). This offers one way for LAs to increase transparency and demonstrate their resilience to the public.

Yet perhaps transparency alone is not sufficient. Do people trust the judgement of their local authority in terms of allocating scarce resources? If they think that they know better, this might skew how satisfied (or not) they are with their local highways (Robinson and Kuemmel, 2004). It might also be affected by the extent to which their views are heard (or felt is heard) by LAs. Especially, if individuals are more likely to notice what is 'wrong'.

For this reason, the aforementioned LGA (2016) Our Day campaign encourages the public to show their support and to celebrate/share what their LA does right. This is because it is easy to overlook the aspects running smoothly and focus on what is not working. The aim is to inform the public about what LAs do by providing information on Twitter rather than expect people to find or ask about it for themselves. While the LGA campaign is useful, LAs should endeavour to raise public awareness by communicating

effectively with residents regularly for maximum impact. This relates to service quality that is in the following sub-section, as part of service quality is effective communications.

Transparency is pertinent at all levels of governance from the allocation of funding by the DfT, to how local authorities spend funding and minutes showcasing what is agreed at parish council meetings. With increasing transparency and managing expectations, the danger is that of broadcasting to the public through, for example, complicated budget reports. This may not be the best form of digestible communications to engage the public and encourage an open dialogue. There needs to be some level of public involvement. Chapter 6 of this thesis looks at public involvement further, in relation to parish councils.

In addition to this, a rationale for decisions made at the local level must be made clear to the public. It is not enough to say where the budget was spent but also how and why it was allocated this way. The importance of effective communications and transparency are highlighted in Chapter 6 on influencing satisfaction via effective citizen engagement, which means appropriate levels of public involvement and good use of communications.

2.4 Service quality

Before considering the key concept of service quality specifically, it is useful to assess what is meant by the term quality. As with benchmarking, different types of quality exist. The table below summarises the type of quality, an example or explanation of it, and the sector(s) where it is commonly found.

Table 2: Overview of types of quality

Type of quality	Explanation / example	Sector where it is commonly found	Reference
Technical quality	Example: speed of repair	Network industries and transport	Coelli et al. (2005)
Labour quality	Example: the knowledge of staff	Health, education and transport	Coelli et al. (2005)
Negligible quality	Observed but hard to perceive as negligible, such as, levels of rain	Environment	Taylor et al. (2014)
Hidden quality	Observable but may not know beforehand, such as, quality of taxi	Service industry / transport sector	Beesley and Glaister (1997)
Unknown quality	Visible quality but the public lack info. on it e.g., marketing spend vs investment spend	Health and transport	Sloan et al. (2001)
Unobserved quality	Individuals lack expertise to fully assess the quality	Health	Sloan et al. (2001)
Salient quality	Example: repaint lines. Looks better/prominent but quality unchanged	Service industry / transport sector	LGA (2016)

Source: own summary of the research on quality.

2.4.1 The application of service quality types

Having summarised the types of quality in the table above, it is worth outlining how these different types of quality could apply to the ELRN. Technical quality is self-explanatory. With LAs, it is implied this involves both responsiveness to road repairs and getting the repairs right the first time around. Hence, a measure of efficiency of the service quality.

Related to technical quality, knowledge of staff facilitates good highways maintenance. However, this labour quality is harder to measure than, say, technical quality. It could be argued that labour quality for LAs also includes the knowledge of customer services staff, as that also impacts on satisfaction.

In terms of the availability of data, the NHT satisfaction survey encompasses technical quality. This is via satisfaction with various aspects: speed of repair, quality of repair and how an LA deals with potholes and damaged roads. Although, none of these variables are used in this thesis, given the precedent for overall satisfaction found in the literature. In addition, preliminary analysis found these aspects yielded similar results to an overall satisfaction measure from the NHT.

Both negligible quality and hidden quality are observable quality types. The difference is that the former is hard to perceive and the latter hard to assess beforehand. In essence, hidden quality can become less hidden quality if, for example, you can see what the traffic on a road is before journeys. With roads, negligible quality can be gritting of the road network that is observed but the sufficiency of the amount of grit used can be hard to perceive. As winter only lasts a few months, gritting is not something that is of great importance in assessing satisfaction with local highways. Also, negligible quality can go

from hard to perceive to easily perceived if, for instance, a lack of drains maintenance (that is hard to perceive) causes an overflow of the drains.

For highways, an example of hidden quality could be road conditions, which are hard to assess beforehand on a new route. (Road conditions is one of the variables analysed in this thesis). Thinking back to expectations, if an individual has expectations about road conditions from past journeys then road condition becomes less hidden and unobserved. This unobserved quality arises when individuals are able to perceive the quality but lack the technical knowledge to fully assess the quality level.

The last two types of quality found in the previous table are unknown quality and salient quality. They are both visible types of quality but can be misleading. For example, there is the repainting of white lines that means an unchanged road quality now looks 'good'. In terms of an unknown quality for highways, it can be hard to know about the decisions behind an LA budget with respect to the spend on highways vs the other spending areas. This lack of justification can unintentionally mislead the lay public into thinking that an LA is not acting in the best interest of quality. Neither unknown quality nor salient quality are in the quantitative data analysis later. Yet, both highlight the importance of perception of satisfaction, as explored in Chapter 5 later on.

Before moving onto the link between service quality and satisfaction, it is worth briefly summarising on the various types of quality outlined here. There exists different types of quality that are all somewhat relevant to local highways. The important aspect is about which of these quality types can be measured? Arguably, all the types of quality can, but some are tangible while the others are intangible.

2.4.2 Service quality and links to satisfaction

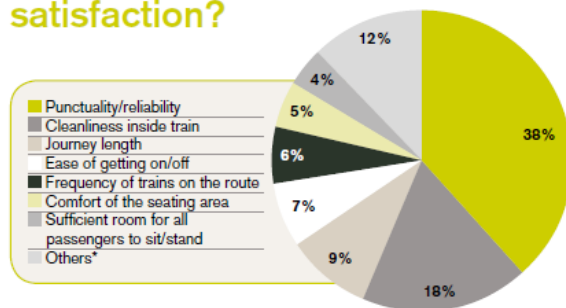
Service quality and expectations are inter-related and influence satisfaction (Ipsos MORI then MORI, 2002). Service quality is the discrepancy resulting from the customer view of service delivery and customer expectations. In relation to the prominent Service Quality model (SERVQUAL), this is expressed as $G(ap) = P(erceptions) - E(xpectations)$ (Parasuraman et al., 1988). Ipsos MORI then MORI (2002) point out that expectations can be according to minimum, tolerable or acceptable service levels. From this, it is gleaned there are different measures of satisfaction (such as, minimum and acceptable): the question is what is measured with service quality for an assessment of satisfaction?

To quote Tyne and Wear Passenger Transport Executive (PTE) “how can the authority achieve its objective of ‘sustaining and...improve the overall quality of service’?” (Forsyth and Smyth, 1986: 405). This gives rise to the issue of how best to assess quality. One measure of SQ is a Customer Satisfaction Index (CSI), which is gained from undertaking a customer satisfaction survey (Guirao et al., 2016). It is crucial to consider attributes from a viewpoint of performance (identifies areas of improvement) and importance (what customers want). It is posited that the importance of attributes can be inferred through relative performance ratings.

In relation to this, the National Rail Passenger Survey (NRPS, 2016) proposes that not all contributory factors are equally important. There are key station/train aspects that have the most impact on overall passenger (dis)satisfaction. The specific station and train facilities that make up overall satisfaction with the journey are listed in Appendix 3. In the pie charts below, ‘Other’ includes components that are all no more than 3% each.

By drawing upon Spring 2016 and Autumn 2015 data, the pie charts below illustrate the statistical and relative importance of various factors on overall satisfaction (ibid: 59). It should be noted this indicates correlation and not causation. With overall satisfaction, punctuality/reliability had most influence with 38% impact.

What has the biggest impact on overall satisfaction?



What has the biggest impact on overall dissatisfaction?

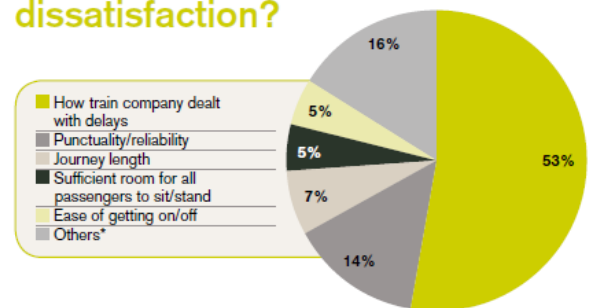


Figure 7: Performance attributes and (dis)satisfaction

For overall dissatisfaction, the majority aspect is more influential with Train Operating Company (TOC) response to delays having an impact of 53% (NRPS, 2016). This statistic highlights that it is not so much about delays occurring but about how it is dealt with to ensure the best possible service quality outcome. There is a key learning for LAs as anticipated highways maintenance often mean delays. It suggests that adequate notice, provision of alternative routes and efficient completion are all important and may positively influence satisfaction even if there are delays. In contrast, an inadequate response to delays can impact negatively on dissatisfaction due to, for example, the need for individuals to arrive at their workplace on time.

It can be argued that the concept of importance is not equal to impact. For example, NHT survey results indicate that ROW are seen as least important (Pinkney and Marsden, 2013) but may have a high impact in rural areas. It is perhaps worth then considering urban vs non-urban differences in importance as those in rural areas may be more likely to rely on certain roads with little/no alternatives.

Laird et al. (2007) draw upon the DfT concept of option values to highlight the importance of having options. For instance, car drivers appreciate having a train as a backup, even though they may only use it occasionally (if ever), for instance, on a bad weather day. Thus, anticipatory demand, that is factoring in for the future travel, is important. Financial crises, for example, can increase the demand for sustainable transport (Efthymiou and Antoniou, 2017) as people may have to increase their commute to ensure employment.

Hence, service quality and factoring in future demand are both increasingly recognised as vital, as highlighted with the post-reform regulation of electricity distribution networks (Giannakis et al., 2005). This can be partially attributed to regulators adopting partial incentive schemes, that aim to reduce costs, achieve investment efficiency, and promote service quality. The inclusion of service quality raises the key question of whether cost savings mean better efficiency, rather than being achieved by decreasing service quality. This leads us onto the related concept of benchmarking and the different forms it takes.

2.5 Benchmarking

Satisfaction is benchmarked, either on its own (such as, the NHT satisfaction survey) or as part of multi-dimensional benchmarking, for example, the CQC efficiency network. (An overview of data sources relevant to this research is found in the next chapter). Given that satisfaction is not some stand-alone measure, it is worth covering the concept of

benchmarking. As benchmarking is not new, the next few paragraphs provide the brief history and a definition of benchmarking.

2.5.1 Benchmarking history and adoption

The term benchmarking is derived from land surveying, as a benchmark referred to a marked point placed on the landscape (Bogan and English, 1994). Within land surveying, a benchmark indicates the present reference point to enable completion of topographical and tidal surveys. The origin of the benchmark implies it was used to ascertain an initial starting point that served as a reference for future measures and/or as a standard for comparative measuring. Therefore, it is possible to distinguish between the concept of benchmark and of benchmarking. The former identifies a performance gap whereas the latter builds on this by detailing why there is a gap.

The far-reaching adoption of benchmarking is attributed to three key reasons (Boxwell, 1994). Firstly, the use of a tried-and-tested approach is the most efficient way for organisations to be better. By over-riding the 'back to the drawing board' phenomenon associated with 'failure', it gives managers the time and creativity to focus on enhancing proven processes and/or adapt these processes for their organisation. Secondly, and as alluded to in the previous sentence, benchmarking expedites an improvements process. Given 'time is money', if benchmarking is done more and more, the process will become faster and faster, which yields returns sooner. Lastly, benchmarking increases overall performance by raising collective standards. That is, a commitment to benchmarking that gradually brings processes up to the global standards.

Before detailing what is meant by benchmarking, it is worth looking at what benchmarking is *not*. Benchmarking is not about adopting a haphazard approach and

hoping that something 'sticks' or works (Bogan and English, 1994). Rather, benchmarking is about a systematic and continuous learning process to enhance performance. Yet, some organisations choose not to engage in benchmarking due to the misperception that existing processes work. Benchmarking is not solely about 'fixing' what is broken but rather about improvement (Boxwell, 1994). Whilst benchmarking involves metrics (such as, Key Performance Indicators (KPIs)), it is not purely a quantitative exercise. For this reason, case studies are useful for understanding how others achieve the best results and learning what works and what does not. However, benchmarking is not about spying on competitors (Lankford, 2000) but learning what works elsewhere and then adapting to suit a particular organisation.

A misperceived criticism of benchmarking is that it leads to copycat behaviour; this could not be further from the truth (Lankford, 2000). Although benchmarking includes taking ideas from the 'best' performers, the tailoring of these learnings to suit the organisational requirements ensures that benchmarking goes beyond just imitation or comparison (Bogan and English, 1994). Thus, although imitation may be an easy path to follow, benchmarking facilitates the development of own ideas and thinking outside the box (Lankford, 2000). Not least because ideas may fail to transfer between organisations so benchmarking is about learning best practice but then considering if ideas will apply to an organisation before its implementation. Therefore, the essence of benchmarking lies in value added improvements, as opposed to improvement or change for the sake of it.

2.5.2 Types of benchmarking and usage

There are many types of benchmarking from day-to-day processes at the lower end of firms (process benchmarking) to more of a focus on senior management, long-term achievements and the exploration of strategies at the top-end of firms (strategic

benchmarking) (Lankford, 2000). The move to multi-dimensional benchmarking, such as, the Cost Quality Customer framework (Wheat and Pinkney, 2013) highlights how benchmarking can (and should) benefit the firms and customers. Performance benchmarking lends itself to multi-dimensional benchmarking with an assessment of products/services by aspects, such as, reliability, quality and other aspects in relation to performance assessment (Lankford, 2000).

Linked to this, internal benchmarking (a type of collaborative benchmarking) is about large organisations conducting a benchmarking process internally (Boxwell, 1994). With internal benchmarking, best practice is still identified but then solely shared with other functions in an organisation. It is important to distinguish between collaborative data-sharing (internally and/or externally) and benchmarking; the former answers “How much?” whereas the latter moves from costs and addresses the “How”. The transition from identifying potential improvement via data-sharing to realising improvement via benchmarking is often left to a third party for a fee.

KPMG (2016) in their report to the Office of Rail and Road (ORR) on benchmarking for Highways England (now known as National Highways) distinguish between bottom-up and top-down benchmarking. Whilst both focus on resources to carry out certain activities or achieve specific outputs, the former compares specific inputs whereas the latter compares total inputs. It is also possible to make a distinction between functional benchmarking and integrative benchmarking (Vorhies and Morgan, 2005). Although both assess capabilities, the former does this individually on a separate basis. In contrast, the latter recognises integration and considers the related aspects from an overall viewpoint.

The previous paragraphs are an overview of the different types of benchmarking with process benchmarking, performance benchmarking and strategic benchmarking corresponding to the lower, middle and top levels respectively of an organisational hierarchy (Bogan and English, 1994). Whilst both bottom-up and top-down benchmarking focus on resources needed to carry out certain activities or achieve specific outputs, the former compares specific inputs whereas the latter compares total inputs (KPMG, 2016). In reality, a benchmarking exercise may pick and choose aspects from benchmarking categories.

With bottom-up and top-down benchmarking, the combination of indicators from both will facilitate a multi-faceted approach to benchmarking given examples of possible metrics (benchmarks) (ORR, 2015 as cited by KPMG, 2016). For National Highways (previously Highways England) who oversee the SRN, the ORR categorise performance KPIs as bottom-up benchmarking indicators. Examples of KPIs include: the number of Killed or Seriously Injured (KSI), user satisfaction, and pound savings on Capital Expenditure (Capex), amongst others. In relation to top-down benchmarking, potential indicators are: costs (renewal and maintenance), network statistics (in KM by road type), and network density (at demographic and axles level).

2.5.3 Benchmarking and service quality

It is thought that service quality should be incorporated into regulatory benchmarking, given trade-offs between costs and service quality (Giannakis et al., 2005). The view then is perhaps that companies should aim to settle for some happy medium between cost benchmarking and public satisfaction rather than solely focus on cost-only or quality-only aspects. By considering cost and quality, companies can 'perform' well when they are assessed on both cost and quality aspects.

One type of performance assessment with potential gains for stakeholders are comparative studies of service quality (Giannakis et al., 2005). In this case, stakeholders are the regulators, firms and customers. For regulators, the comparative approach facilitates knowledge acquisition that can be used to their advantage to feed into targets and incentive schemes for companies. Meanwhile, firms benefit from pitting their performance against others and drawing upon best practice to both recognise and overcome weaknesses. Finally, consumers are in a better position to assess the service quality they receive by showing an awareness of other comparable companies and using relative performance as a benchmark of the standards that they should expect to receive.

Despite the benefits of comparing performance, service quality and related customer satisfaction tend to be ignored when conducting benchmarking where there is a focus on cost benchmarking, over the other types (Boxwell, 1994). Although cost measures are useful to compare performance, it overlooks public satisfaction in relation to user experience. For example, LAs that fix problems quickly are efficient but will score poorly on satisfaction due to lack of notice about roadworks creating noise/dust, diversions, and delays. This implies that efficiency alone is not enough, and not just for local highways.

Thus, for the CQC network, benchmarking is three-fold and consists of Cost, Quality and Customer as stools of performance (Wheat and Pinkney, 2013). The CQC efficiency network recognises how performance is not just about tangible impact, such as, cost and quality of the road network but satisfied customers too. Therefore, best practice is characterised by performing well on all three aforementioned inter-related aspects. In other words, 'doing more with less', as explored next. The sub-section that follows will

examine if improving public satisfaction (partly achieved through the 'doing more' part) vs considering costs (the remaining 'with less' aspect) are (or are not) mutually exclusive.

2.5.4 The 3 E's of benchmarking performance

Kouzmin et al. (1999) note that the various dimensions of performance measurement have changed over the years reflecting a shift in thinking. In the 1980s, attention was focused on performance oriented aspects with the 'three E's'; although, there are different opinions about what is meant by the 3 E's. The diagram below outlines the concept of the 3 E's and their relationship for Otrusinova and Pastuszkova (2012: 174).

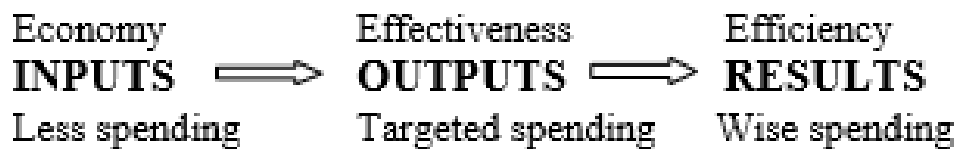


Figure 8: The 3 E's of performance

The diagram above emphasises how cost and better expenditure management used to be the main focus. The need to spend less (i.e., consider the economy), prioritise expenditure (display effectiveness) and still make an impact (via thrifty spending) meant customer satisfaction had previously been overlooked. In the 1990s, a move towards considering the customer meant quality and satisfaction received a bit more attention in performance benchmarking (Kouzmin et al., 1999).

It was suggested previously benchmarking is not just about learning about what is best practice but also about learning from mistakes (Kouzmin et al., 1999). The contextual nature of performance means the identification of Performance Indicators (PIs) can be problematic. Furthermore, some aspects of performance are abstract and that gives rise

to the technicalities/issues of operationalising them. This leads to the questions of what should be considered when measuring performance.

Yet, a different perspective of the 3 E's and performance measurement is evident in the railway industry (Lan and Lin, 2006). There is a focus on efficiency and effectiveness, with their '3 E's' being technical efficiency (outputs from inputs), sale effectiveness (consumption from outputs) and technical effectiveness (consumption from inputs). Overall railway effectiveness is about best practice, that is: "improving the booking system, developing the prepaid ticketing system, and providing discounts to loyal customers, frequent users, or group travellers" (ibid, 403).

The 3 E's provides relevant background on how performance was (and still is to a certain extent) measured. The 3 E's framework in Figure 8 is purely on the basis of aspects of spending, hence, it is very much cost-oriented. It seems while efficiency remains an important criterion, this is judged in relation to considering customer and/or quality. Therefore, efficiency alone is not enough, and a multi-pronged approach is now needed. This is where the CQC efficiency network comes in. Therefore, the next sub-section is on the inter-relationships between cost, efficiency and/or quality.

2.6 Cost, efficiency and quality

Much of the previous literature on satisfaction with local highways has focused on the heterogeneity of individuals. For example, how given individual characteristics, such as, demographics can influence expectations, which in turn impacts on public satisfaction. However, this overlooks the heterogeneity of local authorities who cover different road lengths with varying population size.

As Coelli et al. (2005) note, benchmarking performance (whether satisfaction or some other performance attributes) is challenging. They state this is due to the comparison being akin to apples and oranges and bananas. Thus, the concept of efficiency is now pertinent to consider.

This is because what is efficient for one authority might be inefficient for others, given varying highway lengths. If not operating at an optimal, this means the limited resources are not being used most efficiently. Therefore, this impacts on quality with the important relationship between quality and satisfaction having been explored through this chapter.

In order to understand efficiency, the cost frontier is defined and illustrated. “The cost frontier $c(y, w)$ shows the minimum expenditure required to produce any scalar output, given input prices” (Kumbhakar and Lovell, 2000: 33-4). It encapsulates technical and allocative efficiency, where cost efficiency is calculated via $\exp(-\mu)$. This cost efficiency concept is shown graphically in the Figure below, for highway length (KPMG, 2016: 96).

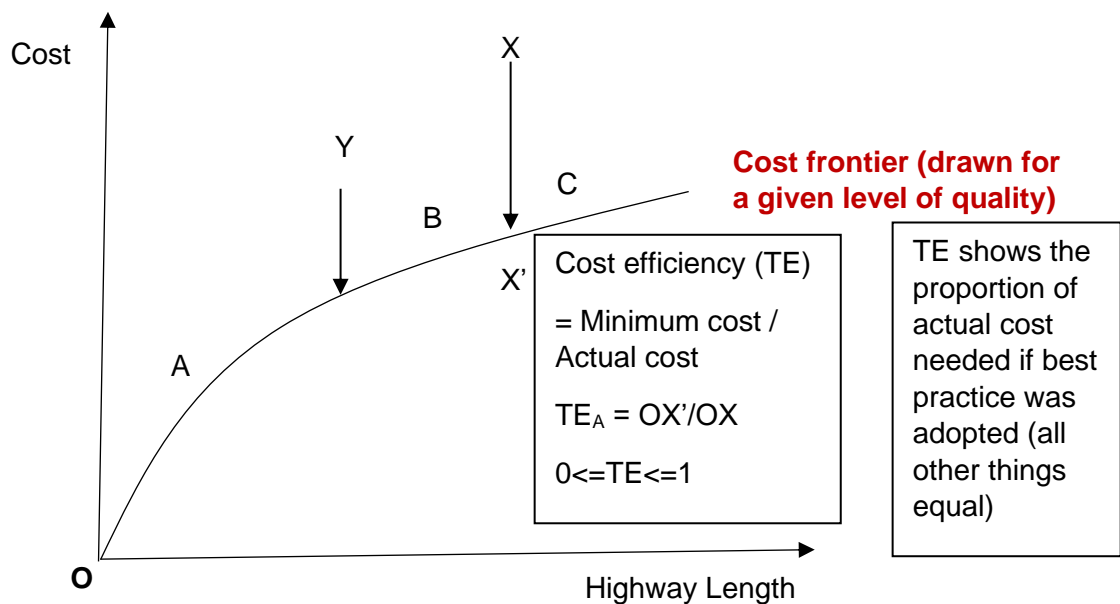


Figure 9: Cost frontier for highways

For simplicity, the cost frontier shown above has a sole cost driver (highway length). However, in reality, there are multiple explanatory variables (or cost drivers). Thus, it is acknowledged there is a simplification in the diagram above, as cost has various drivers.

This cost frontier denotes minimum cost for a given quality, with respect to highway length. Due to increasing/decreasing returns to scale, the convention for a frontier is a curve rather than a straight line. The economies of scale phenomenon explains why the relationship between unit cost and highway length is non-linear. That is, the highways length and cost relationship is affected by access to resources (staff, equipment and so on) and larger LAs are likely to have a greater bank/wealth of resources to draw upon.

The points A, B and C are all efficient as they lie on the frontier so reductions in cost will mean decreased quality and/or output (highway length). As such, points X and Y above the frontier are both inefficient as minimum costs can be attained whilst keeping the quality and highway length constant. Therefore, the vertical distance between an actual cost point (firm frontier) and minimum cost (the cost frontier) indicates potential savings (so, for example, X to X' distance).

In relation to this, the catch-up efficiency concept is proposed by KPMG (2016) in their report to the ORR. "Catch-up efficiency measures the extent to which an organisation maintains and/or renews its road network at minimum cost given its road characteristics...as compared to the performance of other organisations" (ibid: 95). This suggests efficiency is not just a metric to be assessed once but rather over a time period. Some examples of road factors are road length, traffic density, and weather. It highlights how external factors, for example, an existing inefficient road layout are likely to not be in the control of local highways authorities (either permanently or in the short-run). Given

the impact on efficiency and performance, an appreciation of fixed factors at some extent is needed to obtain a true measure of (in)efficiency.

The cost function in Wheat (2017) has satisfaction as an explanatory factor alongside traffic density, road conditions and length of roads. This allows for cost (highways expenditure) and quality trade-off to be examined. As satisfaction is at the forefront of this work, Chapter 5 on the perception of satisfaction has overall satisfaction as the dependent variable while council tax, and not cost, is one of the independent variables.

2.6.1 Cost and quality in the railway industry

This sub-section and the next sub-section looks at the relationship between cost and quality in two different sectors. In Section 2.3.1 earlier on in this chapter, the importance of managing expectations was highlighted. The pursuit of high satisfaction in the face of budget costs (so reduced costs needed) can mean that quality is compromised. Whilst this thesis does not focus on perverse incentives or the cost-quality trade off, it is worth mentioning to emphasise the need to consider satisfaction and not just efficiency alone.

Drawing upon Swedish reforms evidence (1999 to 2011), Odolinski and Smith (2016) explore how Competitive Tendering (CT) of rail maintenance influences cost. This is pertinent for this research as the impetus for CT is cost reduction and increased quality. Also, it may be possible to alleviate informational problems by capitalising on well-designed and well-directed incentive schemes to overcome issues, for instance, rising long-run costs. Quality and heterogeneity (in, for example, infrastructure characteristics) are controlled for and selection bias (such as, reverse causality) also accounted for (ibid). There is also the problem of missing data with the decision to drop an area if more than 20% of the information is missing.

The results indicate that recent contract renewal leads to a 7.4% rise in rail maintenance costs (Odolinski and Smith, 2016). As a renewal is held up to greater standards of quality, it conveys that maintenance of high track quality is only possible through increased maintenance costs. In terms of CT, this had an opposite effect on costs of maintenance with a reduction of 11.4% attributed to the tendering variable. After careful consideration, the authors posit that CT “has resulted in lower costs without negatively impacting on quality” (ibid: 109-10).

It should be noted that in Sweden CT was slowly adopted but in Britain its introduction into the railway industry was more rapid. The former has benefits as gradual exposure allows a manager to demonstrate proficiency and so asymmetric information is experienced to a lesser degree. Despite these benefits, CT does have drawbacks as evidenced by the local government where there has been a move from compulsory CT to best value. This can be summarised via economy, efficiency, and effectiveness to ensure these various areas are targeted (note, this is similar but a slight variation to the 3 E's mentioned in Section 2.5.4 earlier).

2.6.2 Cost and quality in healthcare provision

The need to continue to deliver quality and efficiency plus invest in the face of increased budget cuts is apparent in the National Health Service (NHS) (Monitor, 2016). Monitor (the NHS England regulator) may not be so much about the aforementioned Cost Quality Customer as Cost, Quality and Sustainability. The way to achieve a more sustainable NHS may perhaps be through gaining new insights from overseas and partnerships to disseminate best practice (Syed et al., 2012). The spread of knowledge is encouraged as citizens sometimes find it hard to assess quality due to insufficient information.

One way to assess the quality and efficiency of healthcare is Patient Reported Outcome Measures (PROMs). Nelson et al. (2015) advocate the need for greater granularity when assessing PROMs. This is corroborated by Gutacker et al. (2013) who draw upon generic and specific health indicators to examine cost differences of four surgical procedures (varicose veins, hip replacements, knee replacements and groin hernia surgery). The scarcity of resources in health means a focus on the impetus for differing costs, despite various providers offering an equivalent healthcare service. Thus, transparency is key to shaping public satisfaction as it can increase public awareness of what is feasible given resources that exist.

This is because costs alone do not portray the whole picture as what is perceived to be the same healthcare provision may vary (Gutacker et al., 2013). High costs may simply be attributed to inefficiency, but it can be due to improved patient outcomes. In some cases, more is better as investing in resources pays off with higher quality. In contrast, low costs may (but not always) be synonymous with reduced quality and poor outcomes. There is a recognition that aiming to increase quality can then sometimes translate to improvements in efficiency (reduced resource depletion) and quality (improved health outcomes) so there exist clear benefits.

Having considered the key facets of satisfaction, the remainder of this literature review chapter provides a general overview of all the research methods that are pertinent for this thesis. This precedes the second literature review on key data used for this research. By covering these aforementioned aspects, it provides useful background for the three research chapters that are still to come.

2.7 Overview of quantitative methods

The remainder of this first literature review chapter provides the background to chosen methods and highlights the alternative methods. This is to justify the research methods executed for analyses in terms of incentivising public satisfaction via the DfT (Chapter 4), perception of satisfaction (Chapter 5) and influencing satisfaction through effective highways communications (Chapter 6).

The main quantitative method executed in this thesis is multiple regression analysis. Before looking at the type of regression analysis used in different research chapters, it is worth providing a general definition of what regression is. This provides background for the next sub-sections on regression type, functional form and levels of measurement.

Simple regression analysis is a statistical technique that allows exploration of a single dependent variable and one independent variable. Multiple regression builds on this by analysing the relationship between one dependent variable but multiple independent variables (Allison, year). It is sometimes referred to as Ordinary Least Squares (OLS) regression to distinguish it from other methods, such as, generalised least squares. The advantage of multiple regression is looking at multiple factors (independent variables), whose values are known, to predict a sole dependent variable. In this thesis, our dependent variable is satisfaction and independent variables span efficiency, resilience and other variables, depending on analysis.

2.7.1 Ordinary least squares regression

An OLS regression has to fulfil certain criteria and is used in this thesis. As alluded to in the previous paragraph, OLS regression is an advantageous method as it means multiple independent variables can be estimated simultaneously in the model. The coefficient in

OLS is interpreted as the impact of a one unit change in the independent variable on the dependent variable, *ceteris paribus* (all things equal). In addition, a series of bivariate correlations were conducted, to inform the execution of an OLS regression analysis in Chapter 4.

Bivariate correlation indicates the correlation coefficient between the dependent variable and an independent variable or correlation between two independent variables. However, in the DfT (2016) Incentive Fund analysis in Chapter 4, there was no bivariate screening whereby only statistically significant variables were included in the OLS regression. Instead, the variables included in the bivariate correlations are the same as those within the OLS regressions initially.

2.7.2 Panel data regression method

As N observations are greater than T ($N > T$), the dataset is a cross-section panel as opposed to a time series panel. The panel data method is the one adopted for analysis in this thesis. This takes the form of Fixed Effects (FE) and RE. Prior to outlining the panel data method, alternative methods are highlighted to ensure it is most appropriate.

Panel data is sometimes referred to as pooled data. However, pooled regression OLS is not appropriate as it makes certain assumptions about the data. Related to this, the First Differences estimator, as the name suggests, involves taking first differences (change from previous time period) (Woolridge, 2002). First Differences is easier to implement than FE and if $T=2$ then both yield identical estimates. However, if $T>2$ (as in this case), then certain assumptions need to be assumed to obtain consistent estimates using First Differences estimator. In addition, First Differences relies on data existing for the

previous year (although this can be overcome via interpolation). Due to data gaps, First Differences estimator is not a suitable method for the quantitative analysis in this thesis.

Another way to estimate an FE model is to use the Least Squares Dummy Variable (LSDV) estimator (Okeke and Okeke, 2016). As the name suggests, this involves using a dummy variable for each individual i.e., no. of dummy variables equals N. A dummy variable is a binary variable, with 1 to indicate that individual and 0 otherwise. The reader may realise that this can be cumbersome and not feasible for large samples. As over 50 observations is a large sample, LSDV is unfeasible as the sample size analysed is large.

As such, panel data is the most appropriate method. There is a distinction between FE and RE where the former captures within variation and RE is a mixed model capturing both within- and between- variation (Stata, n.d.). The Hausman specification test identifies whether a consistent FE model or an efficient RE model is the most appropriate to fit the data. The rationale for fitting FE is to account for individual heterogeneity (Torres-Reyna, 2007). But if variation across LAs is thought to impact on the dependent variable, RE should be used instead. Another reason to fit RE is to allow for inclusion of time-invariant variables in models (Torres-Reyna, 2007). A Hausman test assesses the consistency of FE and RE estimator against relative efficiency gains derived from RE.

Given the data possessed forms a panel dataset, a panel data method is used in Chapter 5. Panel data has both benefits and limitations (Baltagi, 2005), although some are not as applicable for this research where the sample used is not the same individuals but rather a growing number of LHAs over time. Nevertheless, in terms of benefits, firstly, panel data allows us to control for individual heterogeneity both at the LA level and over time.

Secondly, panel data results in reduced collinearity among the variables. Lastly, panel data allows for conclusions based upon intra- (within) and inter- (between) comparison.

In terms of panel data limitations, there exists data collection challenges. Although not all pertinent in this thesis, due to support of LHAs. The challenges are attrition (drop out), non-response, gaps in data and reliance on recall. Finally, panel data comes with costs, due to the nature of data collection (large sample, many years and same people). Nevertheless, panel data is the most appropriate method for NHT analysis in Chapter 5. A key characteristic of the NHT satisfaction survey is the use of Likert scale for questions.

2.7.3 General to specific determination

This thesis uses general to specific determination for its quantitative analyses in Chapter 4 and 5. A variation of this is the alternative stepwise approach to model determination (Yan and Su, 2009). A stepwise approach means independent variables are either added (forward addition) or deleted (backwards elimination) from the model iteratively one at a time. There is the forward addition model that starts with the simplest model, rather than ending there. Whereas backwards stepwise regression goes from general to specific. This latter approach is often used, given advances in computational software (Greene, 2012). The latter was the method drawn upon as a starting point for general to specific.

The process for backwards stepwise elimination is as follows (Yan and Su, 2009). Firstly, a model with all the independent variables is fitted. Secondly, the least significant predictor is identified (so the largest p-value) and removed from the model. Finally, this process is repeated until a final model is reached that meets a given threshold, in this case $\alpha \leq 10$. Thus, the maximum steps to reach the final model is equal to the number of independent variables included in models. For this reason, the backward elimination

procedure is the most computationally efficient. As such, the method is frequently used for variable selection when working with a large dataset and large number of predictors.

However, the drawback of the backwards stepwise elimination method is once variables are deleted from the model there is no opportunity to re-enter the model so there is an element of chance (Yan and Su, 2009). To address this, a final test for analysis in this thesis was to take each final model and then add back, in turn, each of the independent variables individually to test for statistical significance, where we found insignificance in all cases. This can help to alleviate the disadvantage of multiplicity (type 1 error inflation).

In this thesis, a specific model was obtained by eliminating the least significant variable (i.e., highest p value) one by one until all the variables were statistically significant (alpha less than 0.10) or left with a base model. This has two disadvantages. Firstly, the tendency for R^2 to be higher if more variables are included in models. Secondly, the issue of potential collinearity between variables. Note, none of the chosen variables were highly correlated. An execution of general to specific determination is in Section 4.5.4.

2.7.4 Levels of measurement debate

The NHT satisfaction data, used in Chapters 4 and 5, is based on Likert scale data. The appropriateness of parametric statistics for Likert scale data is an ongoing debate in terms of levels of measurement. With Likert, there is Likert type data that is derived from an individual Likert question response (Boone Jr. and Boone, 2012). However, Likert scale data is a composite score, or variable obtained from responses to the multiple Likert type questions. In order to understand the levels of measurements debate, it is worth highlighting the different data categories: nominal, ordinal, interval, and ratio. The examples of these data are ethnicity, ranking, IQ, and years of experience, respectively.

Likert type data is ordinal as it is possible to say 5 is greater than 4 but not how much greater (i.e., it is not cardinal - quantitatively meaningful) (Norman, 2010). In this case, descriptive statistics in the form of median, mode and frequencies should be used to interpret results (Boone Jr. and Boone, 2012). Through summation or an average of four or more Likert type items, a composite score is created to then become Likert scale data.

Likert scale data are viewed as interval measurement (Boone, Jr. and Boone, 2012). In this instance, mean and Standard Deviation (SD) are appropriate forms of descriptive statistics. Also, there is additional data analysis is the statistical form of Analysis of Variance (ANOVA), t-test and regression. Whilst Boone, Jr. and Boone (2012) provide a good starting point, in reality, it is more complex. There are certain assumptions for parametric statistics, such as, normal distribution; in reality, Likert data can be clustered.

It is generally more acceptable to distinguish between discrete vs continuous data rather than levels of measurement. Whilst Likert scale summation is widely considered as continuous, the issues raised include: not equally spaced, low sample size and not being normally distributed (Norman, 2010). In relation to the latter issue, Central Limit Theorem states that, given sample sizes of more than 5 or 10 per group, it is less about the original distribution as the average is approximately normal distribution. As Likert scales tend not to be used for qualitative research, it seems unlikely that there would be an insufficient sample of just 2 or 3 respondents for any Likert type data. In terms of the assumption of equal spacing, Likert scale is reasonable as it goes from 1 to 5 whereas other categorical data, such as, none, 1-3 and 4+ papers published in a year is clearly not as equidistant.

It would seem that going from ordinal data to continuous is less of an issue than going from categorical to continuous data (Pasta, 2009). With ordinal data, the spacing is less pertinent when it comes to results unless there are extreme outliers in the data. In summary, it is better to “treat them [ordinal variables] as continuous and to fail to consider that possibility may cause many useful relationships to be overlooked” (ibid: 2).

2.7.5 Functional form specification

As well as making a decision on the appropriateness of parametric statistics for Likert scale data, there was also a decision that will need to be made on the functional form. In relation to functional form, there is the choice of linear, semi-log and log-log to consider (SFU, n.d.). There are other functional forms, but these are the main ones. However, it is first worth considering whether or not satisfaction and utility are similar, given that the latter is presented as a non-linear relationship in the economic literature so is not linear.

Functional form is often determined by economic theory (SFU, n.d.). While economic theory finds evidence of marginal utility, seeing satisfaction in this way implies that satisfaction and utility measure the same thing, which they do not. Hence, a non-linear relationship on the basis of likening satisfaction to utility can be flawed (Levy-Garboua and Montmarquette, 2007). These authors postulate that satisfaction and dissatisfaction measure pleasure and pain respectively. In other words, satisfaction is experienced utility (MORI, 2002) whereas what we know of as utility is, in reality, decision-making utility. The latter is something people maximise, hence, a non-linear relationship is expected for this type of utility. Yet, experienced utility (i.e., satisfaction) is hard to maximise as an individual, given it depends on your feelings/judgements in the moment i.e., perception (see, for example, Giese et al., 2001). This leads on to the next few paragraphs about different functional forms and their respective appropriateness for assessing satisfaction.

The functional form specification decision is governed by three aspects: economic theory, expectations arising from prior research, and statistical testing. With respect to previous satisfaction research, the linear specification is most commonly used (see Table 22). This provides support for a linear model as most suited to our satisfaction research. Having explained the quantitative methods used in this thesis in Chapters 4 and 5, Section 2.8 (next) looks at the qualitative methods that underpin analysis in Chapter 6.

2.8 Qualitative research: interviews

Qualitative research can take many forms: interviews, case studies, focus groups or observations. The penultimate thesis chapter uses semi-structured interviews, given the nature of parish council research. This is because observing might not provide the required data, case studies require detailed examples and the challenge of obtaining parish council participants meant a focus group was not feasible. Thus, an interview method is most suitable in this case. This literature review focuses on dyadic (one-to-one) interviews, rather than group interviews.

2.8.1 The types of qualitative interviews

Gall et al. (2003) outline three types of interviews: informal conversational interview, general interview guide and standardised open-ended interviews. These translate to 'open', semi-structured and structured interviews respectively, which are terms often found in the literature on interview types.

While the literature on qualitative interview agrees on these three types of interviews (structured, semi-structured and 'open'), there is perhaps less consensus about what each mean. For Britten (1995) this latter interview type is in-depth facilitating the detailed

discussion of one or two issues with questions based on responses given. Whereas Gill et al. (2008) refer to this open interview type as an unstructured interview. However, according to Britten (1995), the term unstructured is misleading as no interview is truly unstructured given the need to gain research data to help answer the research question.

There are strengths and weaknesses associated with the different types outlined in the previous paragraph (Gall et al., 2003). An 'open' interview has been likened to a dialogue so is conversational in nature (a strength) but is spontaneous meaning the interviewer may not obtain the rich insights needed (a weakness). Hence, semi-structured interviews overcome this lack of structure but also provide flexibility with questions (an advantage). However, this flexible nature can affect comparability as questions are asked of some interviewees but not others meaning potential bias (a disadvantage). Finally, structured interviews ask all interviewees identical questions so it can be replicated (a strength) but offers almost no flexibility, in terms of allowing for any follow-up questions (a weakness).

As semi-structured interviews lies in between structured and unstructured interviews, it is most suited to the research on Leeds parish councils in Chapter 6. The flexibility of semi-structured interviews will allow for follow-up questions to be asked to gain more insight, whilst still ensuring all interviewees are asked the same list of questions. This then leads us to design of qualitative interviews, in terms of how to design interviews and develop questions to ask the interviewees.

2.8.2 Design of interviews and questions

Interviews differ from surveys as they aim to glean as much information as possible on a topic. Thus, "creating effective research questions for the interview process is one of the most crucial components to interview design" (Turner, 2010: 757). The aim of

conducting interviews is to maximise data, via questions to encourage in-depth answers. Hence, good questions are open-ended ones i.e., go beyond yes/no answers (Gill et al., 2008). However, it is important to avoid leading questions in interviews (Turner, 2010).

The order of questions also matters with easy to answer questions at the start to ease the interviewees in and then ask potentially complex or sensitive questions (Gill et al., 2008). In relation to the order of questions, it has been suggested questions should move from general to specific with the order of questions reflecting the relative importance of questions (Stewart and Shamdasani, 1990). Although this latter advice is for focus groups, this is still good advice for interviews as it means there is good structure rather than a having a haphazard approach to interviews.

A potential way to identify research questions would be to undertake a literature review of the topic (Warren, 2011). This would help ascertain whether your study would contribute to the literature. The literature review does not have to be restricted to the qualitative literature and can include a review of quantitative literature. As qualitative interviews are by their nature not standardised, its relevance for interview design is limited to the early stages of the research. The literature review can generate questions that then develop to become 10 to 12 specific questions.

A review of the literature on parish councils was conducted but more with the parish council context and background information in mind rather than the research method. The work of Bennett (2006) most closely relates to this research, in terms of looking at parish councils in a specific area; in Bennett's case Gloucestershire, in this thesis it is Leeds, rather than look at parish councils generally. Bennett (2006) also used semi-

structured interviews, supporting the views in the literature of semi-structured interviews being a middle ground between the opposites of structured and unstructured interviews.

As tends to be the case with interviews, there is some basic information gained at the start. For Bennett (2006), this was parish name, survey no, parish clerk, interview date, current local issues, and number of parish council members. The pilot study of Leeds (as undertaken in Chapter 6 later) also gains basic information but with the exception of current local issues and instead asks about local highway issues. Our pilot also asks about the year of inception of the parish council to see if recent vs established parishes makes a difference or not.

The interview sheet used by Bennett (2006) does not have questions on it but rather prompts with statements, such as, particular successes and failures of parish councils. This highlights the conversational nature of interviews and how this can negate the need for questions in favour of statements. For this research chapter, the pilot interviews began with general statements (for example, the role of parish councils) before moving onto specific prompts about local highways to ascertain the wider role of parish councils.

2.8.3 Sample size saturation in interviews

In relation to saturation, Mason (2010) reviewed 561 PhD studies to explore sample sizes. The results found that, on average, studies using qualitative interviews had a sample size of 31. The decision to focus only on Leeds (as explained in Chapter 6) for the pilot study in this thesis means that a sample of 31 is not possible; as there are only 32 parish councils in Leeds, it seems unlikely that most of the parish councils would participate to allow a sample size that would be close to average.

This suggests we should aim to interview as many parish councils as possible that provide consent to maximise the sample, as per Bennett (2006). It may be there is only saturation for a particular question, most notably, the one on the role of parish councils as interviewees are likely to mention similar themes. Given the grassroots nature of parishes, it is expected that more interviews will help paint a better picture and themes will arise from the interviews.

Additionally, the Mason (2010) analysis found a bias towards having a sample size that were multiples of 10 i.e., round numbers. This would suggest that there was some pre-meditated approach to qualitative interviews that goes against the nature of interviewing till saturation (that is, interviewing until no new findings arise). The frequency of multiple of 10 samples suggests a pre-determined limit to the number of interviews conducted until an arbitrary number/multiple of 10 is achieved, not saturation as should be the case.

2.8.4 Summary of qualitative interviews

Section 2.8 of this literature review chapter has explored the qualitative interview method. It is clear that much of the literature reviewed is from other sectors, such as, health. Interviews are often considered in relation to focus groups as both provide rich, in-depth, and thick data. The types of interviews fall into three categories: structured, semi-structured and in-depth. The literature mentions the need to maximise rich data gleaned from interviews, hence, interview design is important. A literature review is one way to conceptualise and develop the research questions. For the pilot study (see Chapter 6), to the best of our knowledge, there is no prior research on highways specifically on parish councils. Nevertheless, it is still possible to obtain some insight from generic research.

2.9 Summary

This chapter detailed the relevant concepts and set out the appropriate methods for this thesis. The multi-faceted nature of satisfaction has been explored. Thus, it has been highlighted that satisfaction is not just the result of a 'gap' outside of LA control; there is a role for governance at all levels via transparency, managing expectations and high service quality. The economic concepts of efficiency as well as cost and quality trade-off are pertinent, given questions about how size can affect satisfaction. The chapter has motivated the use of 'overall' satisfaction, given the precedent by NRPS and that encounter satisfaction captures satisfaction for a specific moment so is not a full picture.

Given the heterogeneity of satisfaction, the inclusion of individual characteristics, such as, demographics and consideration of level of involvement with parish councils are both valid. From this Literature Review I chapter, it is evident that satisfaction is influenced by service quality. As service quality is linked to expectations, with the latter aspect being somewhat hard to measure, it is then a challenge to detect the impact of service quality and expectations on public satisfaction with highways.

Given the challenges with measuring service quality, this leads onto the second literature review chapter (next). The next chapter will build on this chapter by exploring how best to assess public satisfaction and will set out the precedent for relevant data sources. Whilst this chapter has covered both quantitative and qualitative research methods, the chapter that follows is solely on quantitative data sources, as a form of secondary data.

3 Literature review II: overview of data

3.1. Introduction

This second literature review chapter provides the background for the quantitative data sources that underpin Chapters 4 and 5. It does this by looking at the alternative data sources (Section 3.2), reviewing road user satisfaction surveys (Section 3.3) and then comparing NHT satisfaction survey with other satisfaction surveys (Section 3.4). This is followed by Sections 3.5, 3.6 and 3.7 on NHT, CQC, DfT, respectively, as used in this thesis. Finally, Section 3.8 concludes.

3.2 Travel data sources considered

There exists a wealth of data sources on local travel. This sub-section outlines the alternative travel data sources considered and why they were not used for satisfaction analysis. This chapter aims to justify using LA data, over individual data, for this thesis.

3.2.1 United Kingdom census

A dataset that covers travel in the UK is the census, which also looks at other aspects (ONS, n.d.). The census covers England, Wales and Northern Ireland but is referred to as the UK census. Scotland has its own census. Due to the pandemic, the census was postponed to 2022 for Scotland but went ahead in summer 2021 for the rest of the UK. The responses from the decennial census are used by many organisations to inform not just transport but also any housing, education and healthcare decisions at the local level.

The completion of the census is a legal requirement (ONS, n.d.) so non-response is not as much of an issue when compared with other surveys, which is an advantage. Another advantage of the census is that it covers the entire population. Yet, this is time consuming and costly. This means a potential disadvantage is that the census occurs every 10 years

with the latest one in 2021. The census covers provides valuable data on mobility of the population as a whole. The census is only for travel data not on population composition.

Specifically, in terms of travel, the census asks about household car availability (ONS, 2011). This overlooks how availability (having a household car) differs from accessibility (being able to drive a car). However, an advantage of the census is that it distinguishes between car passenger and car driver, while other travel surveys see car users as one.

There are three key reasons why census data is not suitable for this thesis. Firstly, in relation to travel, the census only covers economic activity: travel to work or study and migration (ONS, n.d.). This relates back to Section 2.2.1 on the heterogeneity of individuals and their satisfaction. In the case of the census, it is not equitable to overlook those not in employment or study when look at travel. Secondly, the factual nature of census data means travel satisfaction is not a component considered when collecting data. Lastly, the most recent census data available is 2011 and using it would undermine the timely nature of this research; given the introduction of the DfT Highways Incentive Fund in 2016, which underpins Chapter 4. With the census deemed unsuitable for these reasons, there is consideration of other UK annual travel surveys in the next sub-section.

3.2.2 National travel survey

The National Travel Survey (NTS) is a long established household survey on personal travel (UK government, 2021). The UK Data Service (UKDS, n.d.) note the NTS was first commissioned by the Ministry of Transport in the mid-1960s and conducted periodically. Since 1988, the NTS was executed by the ONS as a continuous survey. The NTS has various advantages: provides insights into the latest travel trends, helps inform transport policy and is useful to shed a light on behavioural changes in national travel over time.

With the NTS fieldwork, this consists of face-to-face interviews and a 7-day travel diary (UK government, 2021) The NTS is a cross-sectional survey, as the same individuals are not surveyed over time. Across the NTS as a whole, different levels of travel data are collected i.e., household, vehicle, and individual (day, trip and stage) levels (UKDS, n.d.).

Whilst the NTS provides valuable data on walking and cycling (so not just on motorists) (UKDS, n.d.), there are a few reasons why it will be unsuitable for an analysis of local highways. Firstly, the NTS focuses on the main mode of travel (UKDS, n.d.), for example, the 30 minute train journey rather than the 10 minute walk to the railway station. This overlooks the travel that people undertake on highways, which is underestimated if just look at the main mode. Thus, this provides an inaccurate picture of getting from 'A to B'.

Secondly, unlike the census, there is an issue of self-selection with the NTS. There are certain groups/individuals that might be more likely to self-complete the diary, even if the NTS tells us about travel of all age groups including children (UK government, 2021). Another related issue is that individuals may unconsciously change their travel behaviour for the diary. For example, walk to the corner shop when they usually travel there by car.

Lastly, the NTS is about the travel characteristics rather than travel satisfaction. The NTS covers distance travelled, travel mode and trip purpose among other details (UK government, 2021). Whilst also providing useful data on accessibility and rural vs urban, the NTS tells us more about how and why people travel rather than how they feel about the travel or highways itself. Thus, Sections 3.3 to 3.5, next, cover satisfaction surveys.

3.3 A review of road satisfaction surveys

A number of highways satisfaction surveys exist in Great Britain and internationally (Parkhurst et al., 2015). These satisfaction surveys are outlined in the next table. The table summarises survey name, location, sample size or total surveyed, method and survey design to allow for comparison. With the latter aspect (survey design), this focuses on how the various road user surveys measure satisfaction rather than the type of questions asked, length of survey or other characteristics of the surveys themselves.

The table on the next page shows the commonalities and differences between various road satisfaction surveys. From the limited sample, popular sampling methods are random sampling, quota sampling and, for New Zealand, random, quota sampling (Parkhurst et al., 2015). Random sampling means each person has an equal chance of being chosen at random whereas the latter fits a pre-determined quota, for example, a 50% gender split or a certain number in an age group. In this case, participants are still chosen at 'random' but no longer have an equal chance of being selected due to quotas.

The use of an international road user survey was discounted for a number of reasons. Firstly, an emphasis on toll roads and motorists, which overlooks local roads and those without a car. Secondly, the lack of alignment with the DfT (2016) Incentive Fund, given the somewhat unique governance structure of England (for example, DfT Incentive Fund, Parliament Acts and parish councils). Thirdly, the availability of survey data, with unique, large (cover most England authorities) and high quality data from m2i that is not publicly available used for analysis in this thesis. This data is from the NHT (2018) satisfaction survey and CQC efficiency network. All these datasets are covered later in this chapter.

Table 3: Summary of road user satisfaction surveys

Survey name	Location	Sample or total number	Ages	Recruitment method	Sampling method	Survey design
National Highways and Transport (NHT) Satisfaction Survey	Great Britain	Min. 3300 per local authority	Ages 16+	Postal survey	Random sampling	5 point Likert scale to assess satisfaction with aspect of highways
National Road Users' Satisfaction Survey (NRUSS)	England	Around 2000	Ages 17+	Household interviews	Quota sampling	Last journey to assess overall satisfaction
Transport for London Road Network (TLRN) Satisfaction Survey	London	3538 in 2012	Ages 16+	TLRN users passing various interview sites	Interval	Satisfaction from 0 to 10 and average score gives score out of 100
91 Express Lanes customer survey	California	1000	All inc. under 18	Phone interview or online	Stratified sampling	Perceived value for money used as proxy for satisfaction
State Highway User Survey 2006	New Zealand	1500	Under 24 to 70+	Phone interview	Random quota sampling	Likert scale (1 to 5) to assess satisfaction

Crossroads Road User Satisfaction Survey (RUSS)	Uganda	2587	18+	Longitudinal	Quota sampling	Measure WTP for toll roads and satisfaction
RUSS on the finished part of golden quadrilateral	India	19,816 users	?	Specific roadside areas e.g., hotels	Random sampling	32 variables led to formulation of Road User Satisfaction Index (RUSI) from interviews

Source: own summary of Parkhurst et al. (2015: 17-25).

By omitting international road user satisfaction surveys from consideration, this leaves three surveys: NHT, National Road Users' Satisfaction Survey (NRUSS) and TfL Road Network Satisfaction survey (Parkhurst et al., 2015). The latter is discounted as London is a unique case in transport and exempt from the DfT (2016) Incentive Fund. The NRUSS is most well-known in the UK. This survey is considered in the next sub-section.

3.3.1 National road user satisfaction survey

Transport Focus (2016) oversee the NRUSS. The NRUSS surveys SRN users, with the SRN being the responsibility of the National Highways (previously Highways England). For details of the governance structure of England, refer to Section 1.2.3 of this thesis.

A measure of road user satisfaction, as given by the NRUSS, was one of the KPIs for Highways England (now National Highways) (Transport Focus, 2016). This KPI was composed of scores from various aspects: journey time, management of road works, general maintenance, provision of information, and safety. In the new (later version of) NRUSS, a composite satisfaction measure is not anticipated for reporting purposes as an overall satisfaction measure will be used instead.

As part of the Government's Road Investment Strategy for 2015-2020, Transport Focus (2016) commissioned an independent review of the older version of NRUSS to inform the new/current NRUSS. The review made the case for surveying the drivers only as passengers have a different SRN experience compared to drivers. However, the view that drivers possess 'higher awareness of the SRN' is criticised for assuming that drivers know when they are travelling on local roads vs SRN.

Whilst the NRUSS talks about users of the SRN, it would seem that drivers dominate the data and other road users are an afterthought (Transport Focus, 2016). The process of surveying car passengers, at least in the pilot stage, only corroborates this. It would be misleading to conduct research on public satisfaction by using NRUSS data that, similar to other data, is about motorist satisfaction (albeit, important) and not the general public.

The term 'general satisfaction' over public satisfaction also makes it appear as though non-car users are not part of public satisfaction (Transport Focus, 2016). In other words, the public are drivers and non-car users are part of the general public along with car users i.e., everyone is general public when in reality 'public satisfaction' should endeavour to cover or represent everyone for or in a given location.

In summary, the NRUSS is a useful and well-known source of data for driver satisfaction (Transport Focus, 2016). However, there are a number of issues that led to the use of another satisfaction survey. Firstly, the SRN is not representative of the road network. Recall, the majority of the road network in England is not the SRN but, in fact, local roads overseen by LAs. Secondly, there can be no true assessment of public satisfaction if car drivers (and perhaps car passengers) are the only ones that are surveyed. Thirdly, the NRUSS draws upon the Driver and Vehicle Licensing Agency (DVLA) database, meaning that those who are aged 16 or the elderly who are too ill for a license are not sampled. There has been much research on young people and travel as well as elderly people and mobility; this richness of data is not found with the NRUSS. Lastly, it can be difficult to use the NRUSS for benchmarking: what do you compare National Highways with? The advantage of local authority analysis is it allows for benchmarking to inform whether satisfaction is 'good' compared to other authorities, when controlling for factors.

Whilst this thesis does not use NRUSS data, it informs using overall satisfaction rather than satisfaction with an individual aspect. Transport Focus (2016) also oversee the NRPS where again an overall satisfaction measure is used. The rationale for this is two-fold. A measure of overall satisfaction is ultimately what success is as it means performing well across the board. Also, overall satisfaction provides “a ‘when all is said and done’ level of overall satisfaction” (ibid: 6).

3.4 NHT survey vs other satisfaction surveys

Having reviewed various road user satisfaction surveys (Parkhurst et al., 2015), this subsection compares their characteristics with the NHT satisfaction survey used in this thesis. There exists both national and international surveys, as summarised in Table 3 earlier. There appear to be two kinds of satisfaction surveys: those that rely on recall (providing an overall satisfaction measure i.e., how satisfaction is defined in this thesis) and those that survey in the moment (encounter satisfaction). The NHT satisfaction data in this thesis follows the precedent of previous literature by using ‘big picture’ satisfaction.

3.4.1 Whose satisfaction is being considered?

If, for the most part across satisfaction surveys, the public are seen as citizens (MORI, 2002) then surveys can include nuanced questions on what priorities should be or where the funding should go. This also relates back to expectations: by perceiving survey participants as the public and not ‘customers’ of roads, the importance of managing or setting expectations are highlighted. However, if the public are seen as customers then there is a pressure to exceed expectations, which is unrealistic as the thesis introduction highlighted the funding shortfall faced by LAs.

The survey names perhaps say something about whether the public are viewed as users or customers of the highways (Parkhurst et al., 2015). Among the surveys reviewed, road

user is most common and that can mean pedestrians are overlooked. Interestingly, the only road survey that referred to the public as the customer is the 91 Express Lanes survey in California. This lane in California has a toll road adjacent to a toll-free road and so those who pay the toll should benefit from reduced traffic and improved journey times.

The issue with other road user satisfaction surveys is that road users translates to car users only (such as, NRUSS). This overlooks pedestrians and cyclists who still use the road network but in different ways when compared to car users. While the TfL satisfaction survey does include non-car users, it is London only (Parkhurst et al., 2015). The unique funding structure of London, as highlighted in the Introduction chapter, means it is viewed as a special case in transport. Hence, a TfL survey does not apply to the rest of England.

Of the satisfaction surveys reviewed in Table 3, the only survey that remains is the NHT satisfaction survey if we want to consider non-car users (Parkhurst et al., 2015). The NHT satisfaction survey recognises satisfaction is from the public and not customers, which emphasises roads are a public service and the need to manage expectations. Compared to other satisfaction surveys, the NHT survey has extensive coverage across the country and is not about last journey. To summarise, the NHT survey includes non-car users, views participants as citizens not customers, is not about satisfaction at a point in time i.e., provides a view of overall satisfaction and has wide reach in England.

3.4.2 The ‘minimum’ sample size and age

With the exception of a census, all surveys are a sample of the whole population that is of interest and as seen in Table 3 (Parkhurst et al., 2015) The weighting of responses helps reflect the make-up of the entire population. Apart from the RUSS of India’s golden

quadrilateral, the sample ranges from 1000 to around 3000 people. This is based on response rates and not the numbers invited to take part in any of the satisfaction surveys.

The fact the sample is 1000+ across all but one of the surveys indicates commonality about an appropriate sample size for an assessment of satisfaction in Table 3 (Parkhurst et al., 2015). That is, a sample of around 100 that is acceptable for statistical purposes and found in smaller surveys is not sufficient if wanting to survey the public at large it seems. A large sample size increases precision and confidence levels. To obtain at least 1000 responses, any satisfaction survey should invite 2000 to 3000 people to participate.

The NHT satisfaction survey is not unique in surveying a few thousand people. However, this is the number **per** local highway authority and means the overall total across England is much larger than other surveys (Parkhurst et al., 2015) The next largest total of those in the table is the 19,816 participants for the RUSS in India. This means that, as alluded to earlier in the Introduction, the NHT survey is unparalleled when it comes to total reach. Also, the NHT allows for comparison within and between LAs as the sample size is large.

As well as 'minimum' sample size, there is also minimum age that the surveys consider (Parkhurst et al, 2015). Age is of interest as it sheds light on whose voice is considered in relation to public satisfaction of highways. This is age 16+ for the NHT satisfaction survey that considers highways and 17+ for the NRUSS that surveys road users. From the Table 3 earlier, the majority survey age 16+, and are interested in their views. This raises the question about why, in the NRUSS, the views of aged 16 are not considered.

Interestingly, there are two satisfaction surveys in Table 3 that imply that opinions matter more than the respondent age (Parkhurst et al., 2015). The first is the 91 Express Lanes survey. In this instance, the aim was to survey the person whose decision it was to use the express lane. This is not necessarily the driver or another adult. The second is the State Highway User Survey. This was interested in garnering people's opinions of driving. The current legal age for driving in New Zealand (where the survey took place) is 16 years. However, at the time of the survey in 2006, the legal age was 15 years (that was then raised to 16 years to make the roads safer).

Both these surveys imply that the views of under 16's are valuable when assessing road satisfaction (Parkhurst et al., 2015). Even if not drivers themselves, they have a view of roads and transport costs and/or lack of transport connections may affect their ability to access employment, education and leisure. This means the cut off of 17 years by the NRUSS (based on legal driving age in the UK) is not necessarily justified. It seems then that some road user surveys are only surveying people old enough to drive but not age 16. Hence, the NHT Network recognises the views of 16 year olds who cannot legally drive and endeavour to increase the number of young people participating in their survey.

3.4.3 Recruitment and sampling methods

From the summary in Table 3, it is evident that only two of the satisfaction surveys (that were reviewed) occur at the point of usage (Parkhurst et al., 2015) This is the moment where the public are in the process of using or alighting from the mode of transport. Hence, these users will have been surveyed on satisfaction in 'real time'.

The two surveys where this happens are TLRN satisfaction survey and RUSS for golden quadrilateral in India (Parkhurst et al., 2015). The use of face-to-face surveys means the

need to invite people to participate at various sites and times of day. This is to ensure that surveys are not just of commuters, unless commuter satisfaction is the area that is being surveyed. For example, with the TRLN satisfaction surveys, there were morning, afternoon and evening shifts for the field work.

For the most part, this means that satisfaction surveys rely on recall (Parkhurst et al, 2015). However, this does mean surveys provide a picture of overall satisfaction rather than one 'bad' commute where people respond negatively, as opposed to accurately. The use of non-face-to-face methods means that the sample can be drawn from a file that reflects the population of interest, such as, DVLA license register or postal address file. This means that participation is not dependent on respondents walking or driving by.

As mentioned before, the sampling methods found in Table 3 earlier are mainly random sampling or quota sampling (Parkhurst et al., 2015). There is also interval sampling. With the TLRN satisfaction survey, for example, the selection was 1 in 2 or 1 in 3, depending on the flow of people. In other words, a quieter time of day would mean a 50% chance of selection to reach people at that time compared to 33.3% at busier times of the day. The aim is to increase response rates by accounting for a reduced flow of people so ask more people (translating to 1 in 2 invited to take part).

Satisfaction surveys weight respondents and this might explain why the majority use random sampling (Parkhurst et al., 2015). Random sampling is beneficial as it means that everyone has an equal chance of being selected. While reweighting after collection of data ensures the sample is representative of the makeup of the population, in this case, to reflect the LA demographic. The fact that some groups, for example, elderly males, take part in higher numbers may perhaps say something about the local

authorities and transport operators. It could be that they should do more to reach and engage under-represented groups when it comes to travel at the local and national level.

3.4.4 Assessment of satisfaction in surveys

The assessment of satisfaction in terms of WTP is only found with toll roads (Parkhurst et al., 2015), as expected. But this is not to say that car users do not indirectly pay for the roads. However, with toll roads the decision to pay is a conscious one, implying cost-benefit analysis occurs on the part of individuals. Thus, for toll roads, perceived value for money perhaps says more compared to 'value for money' for roads that are open to all.

The use of a Likert scale is commonly found in public surveys generally, so is not unique to satisfaction surveys. The Likert scale is named after its founder Rensis Likert (Johns, 2010) who wanted to measure public attitudes that could then be analysed quantitatively. A Likert scale is characterised by its two extremes of Strongly Disagree on the left hand side and Strongly Agree on the right hand side.

On the 5 point Likert scale, as below, the responses are: Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree (Johns, 2010: 2). In some cases, the mid-point is a 'Don't know' or 'Not sure' response. With the NHT survey for this thesis, 'Don't know/not sure' is an extra option, separate to a 5 point Likert scale (Pinkney and Marsden, 2013).

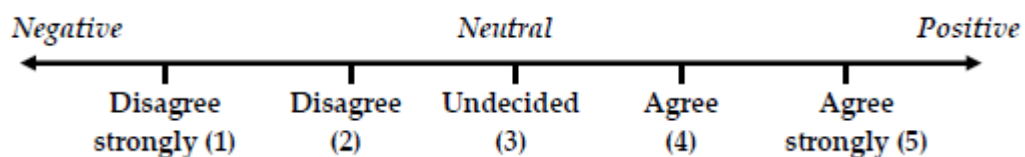


Figure 10: An example 5 point Likert scale

A 7 point Likert scale would also include 'Slightly Agree/Disagree' in between the two extremes of 'Strongly Agree/Disagree' and 'Agree/Disagree' (Johns, 2010). This option is not found in the review of road user satisfaction surveys by Parkhurst et al. (2015) but implies that attitudes (such as, for satisfaction) are not always black and white. A 10 point scale, as in TLRN satisfaction survey, is not a conventional Likert scale as a 10 point scale only uses numbers instead of both words and numbers to denote attitude. Nevertheless, there are similarities with a Likert scale as the left hand side of a 10 point scale is associated with negative responses and the results are analysed quantitatively.

There are various methodological issues associated with using a Likert scale (Johns, 2010). One limitation is that they are ordinal (rank) not cardinal (quantitatively meaningful). It is possible to say that 4 is an improvement over 2, but not that 4 is twice as good as 2.

In addition, approaches to deal with the survey nature of the public satisfaction data can be considered to better integrate this data into benchmarking. For example, the inclusion of a 'don't know' option may impact the response given (Krosnick et al., 2001). In terms of analysis, the 'don't know' and 'doesn't apply' responses are omitted from the results when aggregating satisfaction results, which may mean bias in the NHT Network survey.

Nevertheless, an inclusion of a 'don't know'/'doesn't apply' option in the NHT satisfaction survey (Pinkney and Marsden, 2013) is potentially a strength. It allows people that are not neutral to select an appropriate response to denote undecided. With the other road satisfaction surveys (as in Parkhurst et al., 2015), people who are not sure may be forced to select 'neutral' as that option fits best in the absence of a 'don't know' / 'doesn't apply'

response. By having this latter option, it means the views obtained are a true reflection of how people feel. In the next sub-section, the focus is on the NHT satisfaction survey.

3.5 National highways and transport survey

3.5.1 Usefulness of NHT and background

Prior to and alongside the NHT survey, some LAs conducted their own public satisfaction surveys to improve satisfaction across their LA. Recall from Chapter 2, an LA satisfaction survey is a form of internal benchmarking (Boxwell, 1994). Internal satisfaction surveys are useful but a) as LAs do not ask the same questions in satisfaction surveys, wider benchmarking is limited and b) it raises question about how satisfaction should be measured as LAs can change this periodically in order to do well on their satisfaction. For example, LAs that invest in customer service training may then choose to look exclusively at encounter satisfaction (Bitner and Hubbert, 1994). This is problematic, given the earlier discussion on how overall satisfaction tells more of a story about entire or overall performance, when compared to considering encounter satisfaction on its own.

The NHT satisfaction survey benchmarks satisfaction at LA level (Pinkney and Marsden, 2013). There are a number of advantages to considering satisfaction at an authority level, rather than at an individual level. Satisfaction can act as an additional performance metric, allowing for LAs to explain performance with local context. The issue with satisfaction at an individual level is that it tends to be about specific groups, such as, motorists (Parkhurst et al., 2015). Whereas an LA level analysis allows for an integrated insight into public priorities (Pinkney and Marsden, 2013). Lastly, individual satisfaction and analysis can be somewhat a short-term measure. Whereas LAs can consider both the long-term view of asset lifecycle planning and sustainability (among other aspects).

As such, the NHT survey forms a standardised public satisfaction survey that covers highways and transport in the UK (Pinkney and Marsden, 2013). With limited data for Scotland that has different governance arrangements to England, this thesis just analyses highways in England. Since its inception in 2008, the NHT survey looks at satisfaction for LAs, with LAs using data to manage performance and inform local plans.

There are two notable exclusions to the NHT satisfaction survey (Pinkney and Marsden, 2013). The first is the NHT survey does not cover rail journeys as these are not overseen by LAs, though buses and taxis are. Both of these forms of travel are in the NHT. Another exclusion is that of inter-city journeys and any journeys that arise from outside of the LA.

The NHT satisfaction survey is overseen by m2i with fieldwork by Ipsos MORI (previously MORI) (Pinkney and Marsden, 2013). Ipsos MORI possess extensive experience of working with LAs in England and are a market leader in local government research (see, for example, LGA, 2012). The NHT satisfaction survey is a random, annual, postal survey to benchmark local highways satisfaction over time and between LAs (Pinkney and Marsden, 2013). The NHT survey mainly uses Likert scales to obtain responses with some example questions provided on the next page (Pinkney and Marsden, 2013: 5).

Moving on from execution of the NHT survey, it is important to outline what the NHT survey formation consists of (Pinkney and Marsden, 2013). The NHT survey is 12 pages long and spans a number of transport themes, as driven by LTPs. In this thesis, the satisfaction measures are pertinent. These satisfaction measures are detailed in the next sub-section and in Section 5.3.2 later on in this thesis.

Q1 How important, if at all, do you consider each of the following...?					
PLEASE TICK ✓ ONE BOX PER ROW	Very important	Fairly important	Not very important	Not at all important	Don't know
Good pavements & footpaths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Good cycle routes/lanes & facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Good local bus services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Good local taxi (or mini-cab) services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q2 Now thinking about roads and transport locally, how satisfied or dissatisfied are you with the following ...?							
PLEASE TICK ✓ ONE BOX PER ROW	Very satisfied	Fairly satisfied	Neither satisfied nor dissatisfied	Fairly dissatisfied	Very dissatisfied	Doesn't apply/ Don't know	
Pavements & footpaths.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cycle routes/lanes & facilities.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Local bus services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Local taxi (or mini-cab) services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Community Transport, e.g. Dial-a-Ride & volunteer cars	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
'Demand Responsive Transport' i.e. flexible bus services.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Safety on roads.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Traffic levels & congestion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Levels of local traffic pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Street lighting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The condition of roads.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The local Rights of Way network.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
And taking everything into account, how satisfied or dissatisfied are you overall with transport and highways services?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Figure 11: Example questions from NHT satisfaction survey

As of 2017, an 8 page option for the NHT survey was introduced alongside the 12 page survey (NHT Network, 2019). This affected comparability among LAs and previous years for highways benchmarking indicators. For the most part, LAs opted for 12 page survey.

In terms of participation of LAs, the NHT survey works on a subscription basis (Pinkney and Marsden, 2013). As such, coverage is extensive but not quite universal across LAs in England. The subscription model allows for LAs to opt out in a particular year should they choose to. Yet, the consensus among LAs seems to be that the NHT survey offers value for money with LAs benchmarking, learning from best practice and seeing how they perform in the eyes of the public. In support of this, few LAs opt out of the NHT

survey with high LA participation, even in times of economic uncertainty and budget pressures (more so than usual, that is) for LAs.

It is possible for the public to access benchmarking data and reports on the NHT satisfaction survey from the NHT website to see how their LA is performing (Pinkney and Marsden, 2013). This relates back to the role of transparency that was covered in the Literature Review chapter earlier in this thesis. However, the NHT website is very much oriented towards producing reports for one LA only vs regional/national performance. In 2018, record participation in the NHT Network (2018) survey meant 113 LAs participated.

3.5.2 Sampling and satisfaction variables

The sample for the NHT satisfaction survey is drawn from the postal address file data using the random probability sampling method (Pinkney and Marsden, 2013). There is a minimum sample size with this survey, but the response rate varies across participating LAs each year. The number of individuals surveyed has grown as LA membership of the NHT survey has increased over the years (NHT Network, 2018). The data that has been supplied to the researcher are for the years 2010-2017 (though, the inception of the NHT satisfaction survey was earlier on in 2008).

The NHT Network satisfaction survey is the source of the satisfaction dependent variable in this thesis. Despite its name, the NHT satisfaction survey also covers importance, communication and public transport alongside satisfaction (Pinkney and Marsden, 2013). From a public satisfaction perspective, there is data on satisfaction with certain aspects, for example, speed or quality of repair, plus an overall measure of satisfaction.

As per the NRPS, an overall measure of satisfaction is used in the NHT analysis in Chapter 5. In that chapter, the dependent variable is public satisfaction with condition of road surfaces. The NHT overall satisfaction variable aims to be representative (Pinkney and Marsden). Thus, a low response rate among certain groups in the NHT survey is overcome by weighting the respondents and also having a minimum sample size for LAs.

3.6 Cost quality customer efficiency network

The previous chapter highlighted the relationship between quality and satisfaction (via the two schools of thought in MORI, 2002) and cost and quality (through an example of a cost frontier (KPMG, 2016)). Recall, from the Introduction chapter, LAs face funding pressures, which drives a need for LAs to 'do more with less'. This would imply some form of efficiency but while also delivering and improving on satisfaction and quality. In order to move away from efficiency alone (as is the limitation of some prior research), there is then a desire to look at more holistic measures of performance of local highways.

In order to do this, the work of the CQC efficiency network is most pertinent (Wheat and Pinkney, 2013). The CQC network was developed in 2009 to explore, in their own words, "the relationship between Satisfied Customers, Cost Effective Delivery and Technical Quality" (ibid: 6). Since 2015, the CQC network has operated on a subscription basis to share best practice and improve on efficiency.

The CQC efficiency network provides a three legged stool to assess the performance of highway LAs by focusing on the aforementioned Cost, Quality and Customer (hence, the CQC) (Wheat and Pinkney, 2013). The CQC provides another way of benchmarking LAs in relation to local highways in England and is on a like-for-like basis. This way of

benchmarking to compare means there exists some overlap between the LAs that participate in the NHT satisfaction survey and the LAs that are part of the CQC network.

The CQC efficiency network is an established collaboration between m2i and the Institute for Transport Studies (ITS) department at the University of Leeds (Wheat and Pinkney, 2013). While NHT surveys residents in participating LAs, the CQC obtains and collates data from the LAs themselves. This includes data on, for example, the efficiency of LAs.

As with NHT satisfaction data (that provides benchmarks for satisfaction with highways), the CQC data is also a first for the highways sector (Wheat and Pinkney, 2013). The relationships between cost and quality but also between satisfaction and quality are both well evidenced. For the first time, these three aspects (cost, quality and satisfaction via customer) came together via the CQC network, to objectively measure LA performance.

The usefulness of the CQC network to identify the efficiency gap means that, as with the NHT survey, LAs are invested and provide data annually (Wheat and Pinkney, 2013). Across both the NHT data and CQC data, there were 91 LAs for analysis (as in Appendix 1) in 2017. This merged data provides a unique dataset, only accessed by m2i and ITS.

Unlike NHT survey data, the CQC data is not publicly available in any form, though reports using CQC data are (Wheat and Pinkney, 2013). The CQC efficiency rating provides a unique efficiency measure that is the only common measure that allows for the comparison between LAs. The CQC (2018) network has gained traction and, as with the NHT survey, is recognised in the DfT (2016) Incentive Fund guidance as evidence. In 2018, membership growth meant that 92 LAs were part of the CQC efficiency network.

To date, this chapter has considered two well-established and quality data sources (NHT and CQC) for local highways that underpin the quantitative research thesis chapters. Continuing with the quantitative focus, the next sub-section outlines the DfT (2016) Incentive Fund data. The qualitative nature of parish council data means the background to the only qualitative data source used in this thesis is in the penultimate thesis chapter on parish councils i.e., self-contained. For local context on parish councils and Leeds (the area under study), again, this will be detailed in the penultimate chapter of this thesis.

3.7 Department for Transport: key data sources

This section provides an overview of the Incentive Fund data and road conditions data, which are obtained from the DfT. The latter is used for analysis in both Chapters 4 and 5. The former is only used in Chapter 4, and the next part builds upon Section 1.2.2 on local highways funding by focusing on providing details of the DfT (2016) Incentive Fund.

3.7.1 The DfT Highways Incentive Fund

The DfT (2016) Incentive Fund is open to all LAs in England except for London and those with a highway maintenance PFI namely Birmingham, Isle of Wight and Sheffield. The transfer of power to local level has meant devolved LAs (identified in Appendix 1). These devolved LAs submit a self-assessment, yet automatically obtain the maximum amount of DfT incentive funding. Isles of Scilly does not receive DfT highways incentive funding.

LAs that take part in the DfT (2016) Incentive Fund complete a self-assessment questionnaire annually based on 22 questions (see Appendix 4). These 22 questions encompass five strands: asset management, resilience, customer, benchmarking and operational services delivery. For each question, LAs rate themselves as Level 1 (basic),

2 (good) or 3 (excellent) using the strength of evidence (with suggested evidence in guidance notes) to ascertain a Level. This evidence is not submitted with the self-assessment questionnaire but is approved by the Section 151 (Chief Finance) Officer and also a selection may be audited by the DfT. The self-assessment basis for funding encourages LAs to reflect on all of the varied aspects of the aforementioned five strands.

At the top-level, LAs obtain a Band result from the DfT (2016) Incentive Fund: Band 1 (little or no maturity), Band 2 (basic to good) or Band 3 (very good to excellent) (Kemp, 2017). It is the Band that determines the amount of Incentive Fund that LAs receive. However, Band data are categorical and so are not quantitatively meaningful. Thus, this analysis will focus on strand scores and overall score, so uses cardinal numerical values.

The 22 self-assessment questions are not split evenly across the five strands highlighting certain emphasis by the DfT (2016) on asset management. The number of questions for each strand are in parentheses: asset management (8), operational services delivery (6), resilience (3), customer (3), and benchmarking (2). The strand scores are obtained by summing up (from the questions in each strand) the Level result of 1, 2 or 3 that gives a score of 1, 2 and 3 respectively. All strands (except customer strand) are underpinned by the Highways Maintenance Efficiency Programme (HMEP). The strand scores matter as they are granular, given it is possible for LAs to obtain the maximum DfT incentive funding despite receiving the minimum/lowest possible score for the customer, resilience or benchmarking strand. The questions corresponding to each strand are in Appendix 4.

The research team have unique access to 2016, 2017 and 2018 results from the DfT (2016) Incentive Fund. In addition, there are various devolved LAs that automatically received Band 3. For those devolved LAs, our unique dataset identifies their score for

each question. That is, a devolved LA may be Band 2 in the data provided to us by the DfT but noted as Band 3 with no corresponding score in the dataset that is published publicly. Lastly, three years of DfT Incentive Fund data, and not just a year, increases the robustness of data.

3.7.2 DfT measures: road condition data

The type of road determines the method used to assess the road condition in England. Recall, from Figure 1, that local roads in England are classified within a hierarchy: A, B, C and U (Unclassified) roads (House of Commons, 2019). More broadly, the local road network is split into either classified (A, B and C) roads or Unclassified (U) roads (DfT, n.d.). This distinction is important, in terms of the survey used to derive road conditions.

For classified roads, Surface Condition Assessment of the National Network of Roads (SCANNER) survey is used (DfT, n.d.). This is an automated survey commissioned by the LHAs to assess the surface condition of roads. In contrast, a Coarse/Detailed Visual Inspection (CVI / DVI) survey is a manual inspection of roads. CVI and DVI tend to be used for U roads, although some LHAs use SCANNER survey instead. CVI is a coarse, rapid survey, often with a slow-moving vehicle to assess a large part of the road network, which may simultaneously or individually inspect cycle ways and foot ways (DfT, 2019). Whereas DVI is a more detailed and walked survey that classifies defects rigorously. The DVI survey is generally focused on the areas that were pinpointed by either the CVI or SCANNER survey as potentially in need of maintenance and worth a closer inspection. Both methods are robust, and this means the DfT data provides objective, trusted data on local road conditions, which is important to emphasise, given its role in later analysis.

The road condition data is available as either aggregate or by road type (DfT, n.d). The roads are rated on a 'traffic light' system of red, amber and green, as determined by road condition indicator outputs from SCANNER survey. The road condition indicator outputs range from 0-315 with thresholds for the ratings as follows: green (0-40), amber (41-99) and red (100+), A road condition that is red or poor shows considerable deterioration and denotes that the road may need maintenance in the coming year. Amber is in the middle and indicates some deterioration is present so LAs may investigate this section further or flag this road section as potentially needing maintenance soon. Thus, amber can act as an early warning for LAs. Finally, there is green where the road network is in excellent condition and does not need maintenance at this point in time. The sum of red, amber and green ratings are 100 when reported meaning a high red score indicates 'bad' roads.

3.8 Summary

This chapter aimed to justify and provide background on the quantitative highways data sources used in this thesis. By outlining various alternative data sources on travel, the chapter outlined how our dataset is unique and differs from other data sources that cover transport. Hence, previous research that used different data sources are valid, but our analysis of robust LA level data contributes to the research in this area.

It is useful to summarise the three key data sources for this thesis (recall, Chapter 6 only uses qualitative data that is contained in that chapter itself). These key data sources are DfT Incentive Fund, NHT satisfaction survey and CQC efficiency framework. The table below is an overview of the three data sources and how they relate to the thesis chapters.

Table 4: Summary of key data sources

Aspect	DfT Highways Incentive Fund	NHT Network satisfaction survey	CQC efficiency network
Overseen by	DfT	Ipsos MORI and m2i	M2i and University of Leeds
Participation	All exc. London and highways PFI LAs	113 LAs in 2018 on a membership basis	92 LAs in 2018 on a subscription service
Completed by	LAs as part of a self- assessment and collate evidence	Random members of the public in participating LAs	LAs submit data required for analysis/comparison
Satisfaction	Band 1, 2 or 3	5 point Likert scale	
Within thesis	Chapter 4 only	Chapters 4 and 5	Chapters 4 and 5
Outcomes	Determines incentive funding given to LAs and encourages LAs to be reflective	Benchmarking LAs and, for an LA, the public can see or compare satisfaction	Determines the LA efficiency gap so allows LAs to save money and deliver

Source: own summary of data sources.

The research chapters that follow make a significant contribution in a number of ways. Overall, the research goes beyond efficiency and makes the case for satisfaction being a valid performance metric. In Chapter 4, there is a unique collated dataset to assess how best to incentivise LAs to deliver on satisfaction alongside efficiency. In Chapter 5, a focus on highways satisfaction yields satisfaction that is useful to highway LAs. Finally, in Chapter 6, the pilot study sheds light on the role of grassroots (parish) governance in terms of influencing local highways satisfaction. With a tendency for qualitative research and parish councils to be overlooked in highways and transport more widely, the penultimate chapter contributes to an under-researched area.

4 Incentivising public satisfaction

4.1 Introduction

In various sectors, funding is awarded on the basis of value for money (for example, efficiency and quality) in order to incentivise organisations. The main objective of these incentive schemes are to positively influence behaviour to facilitate the maintenance or improvement of standards so that overall standards rise. This can be financial incentives in the form of reward only, penalty only (hence a financial *disincentive*) or reward and penalty. The implication is that those organisations that do well enough to access the top level of incentive funding are 'good' performers, according to given criteria for incentives.

This first research chapter will assess if this is the case for LAs by considering selected highways-related outcomes from benchmarking LAs in England. This research has been motivated by the existence of the DfT (2016) highways Incentive Fund. As outlined in the introduction, the DfT is the government department responsible for transport in the UK. Recall, highway LAs or LAs define those local authorities responsible for maintaining local roads in England; these local roads do not include the SRN (the motorways and trunk roads, overseen by National Highways (previously Highways England)).

Up until 2016, highways funding was primarily based on capital funding; namely, the Needs Fund that allocated funding based on the RL that LAs oversee (Kemp, 2017). Section 1.2.4 provided details on local highways funding in England prior to and during the DfT (2016) Incentive Fund. Hence, it is seen that it was only in 2016 (albeit piloted in 2015) that financial incentives became a part of the funding makeup for highway LAs. This has introduced an element of performance management funding that is ring-fenced.

It is important to note (again) the DfT (2016) Incentive Fund contrasts with competitive bidding for other funds, such as, the Potholes Fund (Kemp, 2017). There is £578 million across 5 years that is ring fenced for the DfT Incentive Fund, which means that highway LAs are not competing for the funds and can attain 100% of their total allocation. Further information about the background to the DfT Incentive Fund was provided in Section 3.5.

Due to budget pressures, there is an increasing need for highway LAs to do more with less, that is, deliver outcomes of (among other aspects) road condition, asset management/efficiency and public satisfaction despite a funding shortfall. The motivation for the DfT highways Incentive Fund is to reward LAs that can show “they are delivering value for money in carrying out cost effective improvements” (DfT, 2016: 1). This implies that LAs that perform well on the DfT Incentive Fund should also be delivering in terms of outcomes.

The DfT (2016) Incentive Fund introduced a performance management element into the relationship between local and central government where previously there had been none. But what is the DfT Incentive Fund *really* incentivising? The DfT Incentive Fund guidance states that the fund incentivises LAs for demonstrating ‘value for money’ and improved cost effectiveness measures. Thus, it is implied that a proportion of highways funding is contingent on doing more with less. The DfT Incentive Fund is allocated based on a self-assessment survey focusing on good processes over realised outcomes. As such, there is a potential issue around whether this focus will reward good outcome(s), which this chapter explores.

The analysis in this chapter considers three broad outcome types: value for money (efficiency), technocratic aspects related to the condition of the asset (Road Condition

measures known as “RDC”) and public satisfaction outcomes (as measured by a public satisfaction survey). RL is included to assess the impact of the size of LAs in terms of their ability to access incentive funding. The analysis considers three years (2016-18) and justifies why later data is not analysed.

Following this introduction, the structure of the remainder of this chapter is as follows. Section 4.2 forms the Incentives Literature Review and is followed by Section 4.3 on Data. Section 4.4 covers Method, which is followed by the Results and Discussion in Section 4.5. Finally, Section 4.6 concludes.

4.2 Incentives literature review

Having previously covered the generic literature review that underpins the entire thesis, this sub-section provides a Literature Review that is specific to the DfT (2016) Incentive Fund. In the first instance, there is a focus on learnings of the LTPs mentioned in Chapter 1. This is followed by generic incentives literature that goes beyond the transport sector to consider other public services.

4.2.1 Incentives in transport

The DfT (2016) Incentive Fund was only introduced in 2016 after a dry run. During the dry run in 2015, no incentive funding was allocated for that year but highway LAs were invited to participate and provide feedback before the 2016 inception of the DfT Incentive Fund. Given the recent availability of DfT Incentive Fund data, and to the best of the researcher’s knowledge, there is no previous research that draws upon all of the strands of the DfT Incentive Fund, as in this case.

However, the DfT (2016) Incentive Fund is not the start of performance-based funding for LAs. As previously mentioned in the introduction chapter, the previous performance frameworks in the UK have consisted of both LTPs and BVPIs. As LTPs most closely aligns with the DfT (2016) Incentive Fund, in that both are transport specific, the remainder of this sub-section draws parallels between these two schemes.

LTPs came to the UK in 2000 and consisted of a five year horizon and five year finance plan for local transport authorities (Marsden et al., 2009). However, it was not until 2004 that the awarding of future capital funding was partly based on the performance achieved by each UK local transport authority (Nellthorp and Marsden, 2007). While the DfT (2016) Incentive Fund only covers England, the LTPs were present across the whole of the UK.

There were two rounds of LTP funding: LTP(1) from 2001-2006 and LTP(2) from 2006-2011 (DfT, 2009). These LTPs fall under the scope of local transport authorities so go beyond highways. The DfT LTP guidance encouraged consultation with local bus and rail operators, public transport user groups and relevant groups, such as, environmental organisations and disability groups. This is not required for the DfT (2016) Incentive Fund. Nevertheless, there are parallels to be made between the DfT Incentive Fund and LTPs, such as, be holistic by going beyond efficiency.

As a performance-based payment, the DfT (2016) Incentive Fund differs from the LTP performance oriented payment. There is additional ring-fenced funding for the DfT Incentive Fund meaning that if all LAs obtain the top Band of Band 3 then the maximum allocation would be paid out to each. Hence, with the DfT Incentive Fund, LAs are not competing with each other but rather competing against given criteria.

Whereas the LTP2 reward based system meant LAs were bidding/competing with other LAs “based on the targets they set and the apparent (and then actual) ability to deliver them” (Marsden et al., 2009: 60). The targets for LTP2 were outcome oriented; these should be challenging yet realistic. Outcome oriented means targets based on outcomes and “whilst it is not certain that these targets will be met it appears that the absolute outcomes achieved are likely to be better than they otherwise would have been” (Marsden et al., 2009: 59). Hence, LTP2 targets were probably conducive to realising outcomes in reality. That is, for example, authorities were rewarded for reducing fatality numbers rather than the *process* of lowering casualties through, for example, money spent on traffic calming measures.

In contrast, the DfT (2016) Incentive Fund mentions targets but only in reference to monitoring or (re)setting targets rather than an emphasis on an achievement of outcomes. For example, one requirement for the customer strand is for LAs to partake in a public satisfaction survey but not necessarily to improve public satisfaction or make any changes. This is corroborated by the DfT Incentive Fund guidance stating, “where it [an LA] has not achieved these targets, it can demonstrate that it has reviewed its targets and these have been reset” (DfT, 2016: 17).

Although the LTP reward based funding was competitive, an advantage of it over the DfT (2016) Incentive Fund was that both large and small LAs were equally able to access the LTP funding so it was an even playing field (Marsden et al., 2009). Based on this, it is important to also assess whether small LAs are equally able to access the DfT (2016) Incentive Fund. A possible advantage of the DfT Incentive Fund is that it was clear to LAs beforehand what was needed to obtain each Band and how the funding would work.

There was also a dry run in 2015 with indicative allocations for each LA by Band published beforehand so LAs knew how much funding they would receive for each Band.

In contrast, the drawback of the LTP payment system was the lack of prior knowledge and clarity as to how it would work for LAs (Marsden et al., 2009). With the LTP reward scheme, the decision not to publish the complete information before the assessment was partly attributed to wanting to overcome the perverse incentives issue. Whereas with the DfT Incentive Fund, perverse incentives may occur as it is possible for LAs to focus on certain criteria at the expense of outcomes and the achievement of targets. It would seem then the 'best' payment-based performance management system for LAs would take the strengths of the Incentive Fund and LTP schemes while avoiding the drawbacks of each. In theory, this would be ideal but how or whether this could work in practice is unknown.

As LTPs came before the DfT Incentive Fund, the literature on LTPs does not draw upon the DfT (2016) Incentive Fund. There seem to be very few references to the DfT Incentive Fund in the academic literature. For instance, Shah and Axelsen (2016), only focus on the resilience strand; hence, no prior work has yet systematically explored the outcomes as is the case with this study. Hence, this chapter makes a significant contribution to the performance or outcomes literature. Having considered transport specifically, there are also learnings to be gained from performance incentives in other sectors, as found next.

4.2.2 Performance incentives

The concept of loss aversion is the rationale for the use of penalties for organisations. Unless you categorise the loss of incentive funding as a penalty, the DfT (2016) Incentive Fund does not penalise highway LAs for not achieving the top Band. Similarly, the SCLGCP (2016) Better Care Fund does not penalise clinical commissioning groups and

LAs. However, in contrast, the Office of Gas and Electricity Markets (Ofgem, 2013) refer to penalties within their performance management incentive scheme. Although, Ofgem has a maximum penalty (and reward) score recognising penalties alone are not enough. Hence, incentives and penalties imply a holistic approach to performance management.

The use of financial incentives with the DfT (2016) Incentive Fund is similar to other sectors, such as, the health sector. The NHS in England uses financial incentives to improve mental healthcare (Monitor, 2015) and incentivise integrated health care and social care via Better Care Fund (SCLGCP, 2016). The former (Monitor) has penalties whereas the latter does not. The involvement of two parties with Better Care Fund may explain an absence of penalties given shared accountability can mean it is a challenge to ascertain responsibility.

In terms of a key difference, there is a reliance on using evidence with the DfT (2016) Incentive Fund as opposed to metrics, with metrics found in both the Better Care Fund (SCLGCP, 2016) and the Ofgem (2013) regulation model for electricity distribution network operators. The non-storability and non-transportability characteristics of transport are pertinent to explain the differing performance assessments in transport compared to health and electricity sectors. The non-consumption of a given health service or gas at a certain time is not as problematic as the non-consumption of non-storable transport. That is, the light emitted from street lighting cannot be stored if unused by the public. Given this, if “one could separate the efficiency measurement (transforming the inputs into outputs) from the effectiveness measurement (transforming the outputs into consumptions)” (Lan and Lin, 2006: 387) then it is proposed that performance assessment of non-storable commodities could then prove to be highly valuable.

When assessing performance, three categories are common. This implies a balance between too few to assess variation in performance and too many that assessment is unmanageable. For example, the Teaching Excellence Framework in the UK awards Higher Education institutions with bronze, silver or gold (Times Higher Education, 2017). Another example of having three categories is the Office of Water Services (Ofwat, n.d.) assurance rating to incentivise high quality information among other aspects. Thus, the DfT Band 1, 2 or 3 is in line with other performance schemes that have three categories.

Passenger Focus (2012) highlight that incentives should encourage the mediocre to reach an average but not to the detriment of challenging average performers to become good or even excellent. The improvement in DfT scores over time by LAs in the DfT (2016) Incentive Fund implies there was a learning process/curve. The dry run of the DfT Incentive Fund highlighted the need for a balance between performance assessment that is realistic and challenging but not so challenging that it becomes unrealistic. Therefore, performance criteria should be sufficiently challenging yet achievable for all.

Taking a customer-centric performance approach, Passenger Focus (2012) posit to the Office of Rail and Road (ORR) that incentives should prioritise increasing passenger satisfaction with areas passengers most want to see improve as outcomes. Specifically, incentivise punctuality and reliability as these are major drivers, as was ascertained in the National Passenger Survey. In addition, the ORR 2013 Periodic Review outcomes include economic growth, connectivity and environmental sustainability. However, these are secondary compared to the primary objectives of passenger and freight customer satisfaction, in line with the Passenger Focus importance of satisfaction. While the satisfaction outcome is not rail-specific, the outcomes of punctuality and reliability are. Yet, these outcomes can translate to the highways sector if we instead consider speed

of repair and quality of repair (get it right the first time) respectively as potential outcomes to model.

As mentioned, environmental sustainability is an outcome in the rail sector but does not feature as an outcome in the water sector despite its importance for water or waste-water companies. The Ofwat (n.d.) assurance rating criteria are interesting as they are not based on outcomes, such as, clean water and environmental sustainability but rather enablers to better outcomes. Specifically, good governance, accountability and quality information. These are not outcomes per se but should facilitate better outcomes, for example, customer satisfaction or user experience.

A key part of good governance is transparency, which can be viewed as enablers to better outcomes (see table below, for example, Ofwat, n.d.). That is, weak performance in one area should not be hidden/couched within an overarching favourable performance result, as with road surveys (Transport Focus, 2016). This is the rationale for considering both overall DfT score and the DfT strand in this chapter. The table below summarises outcomes and enablers to outcomes corresponding to different sectors. Enablers to outcomes, for example good governance, can facilitate outcomes, such as, satisfaction. Although the list is not exhaustive, there is little overlap between outcomes, implying outcomes are sector-specific. Note, effectiveness is an implicit (not explicit) outcome.

Table 5: Outcomes from various sectors

Rail	National	Ofwat	Health	Incentive
	Highways	assurance	SCLGCP	Fund

<i>Outcomes</i>				
Economic growth	X			
Connectivity	X			
Environmental sustainability	X			
Satisfaction / user experience	X	X	X	X
Punctuality	X			
Reliability	X			
Cost savings		X		
Killed or Seriously Injured		X		
Admissions			X	
Delayed Transfer of Care			X	
Effectiveness			X	X
Local metric			X	

<i>Enablers to outcomes</i>				
Governance			X	X
Quality information			X	
Accountability			X	

Source: own summary of incentives literature review.

4.2.3 Summary of incentives literature

In summary, targets or metrics used to assess performance are largely framed in terms of outcomes. One exception is the Ofwat assurance ratings for water companies underpinned by enablers to better outcomes. There is a distinction between inputs, outputs and outcomes.

“Inputs (e.g. investment of 1bn Euro in road safety during 2003), outputs (e.g. construct 1000 new-style pedestrian crossings in 2004), or outcomes (e.g. reduce the number of fatalities by 5% per year between 2003 and 2010)”. Nellthorp and Marsden (2007: 18)

The transformation of inputs into outputs measures efficiency, which is implied in the literature. The emphasis on processes over outcomes in the DfT (2016) Incentive Fund means a contribution by examining if improved outcomes are associated with improved processes. This analysis uses a unique dataset and is motivated by the DfT Incentive Fund that rewards good processes but are these processes associated with good outcomes? In essence, what are the benefits of the DfT Incentive Fund: good highway processes only or good highways outcomes as well?

4.3 Impact of size on Incentive Fund performance

Before considering this question and the form all the different Incentive Fund data takes, the preceding incentives literature review raised a key question about the relationship between size of LAs and performance. This was alluded to in the introduction chapter that outlined the heterogenous nature of highway LAs. With the prior LTP funding, the playing field was said to be level (Marsden et al., 2009) and motivates this sub-section.

The impact of size is considered to illustrate if there is a noticeable difference between the performance of small and large LAs on the DfT (2016) Incentive Fund. Of interest is whether, after controlling for the level of outcomes, larger LAs score higher or lower than

smaller LAs. If the DfT Incentive Fund truly incentivises better outcomes, there should be little relationship between the size of LAs, measured by road length, and Incentive Fund score (overall or strand). However, and counter to the last sentence, it is recognised the preparation of a self-assessment submission for 22 questions of the DfT (2016) Incentive Fund (listed in Appendix 4) can be resource intensive. As such, the smaller LAs may be limited in terms of staff and evidence to prepare a submission or engage in the specific process initiatives encouraged for the self-assessment. Therefore, the implication is that large LAs are at an advantage within such an assessment process.

To help provide initial insight into this, the graph below assesses if a particular size (small vs large LA) is associated with a higher DfT score. Small LAs, in this case based on road length, are in the bottom 20 percentile and large LAs in the top 20 percentile. Across both percentiles, there is a total of N=41 LAs, roughly split equally among small LAs (N=22) and large LAs (N=19) (i.e., medium LAs excluded for small vs large comparison).

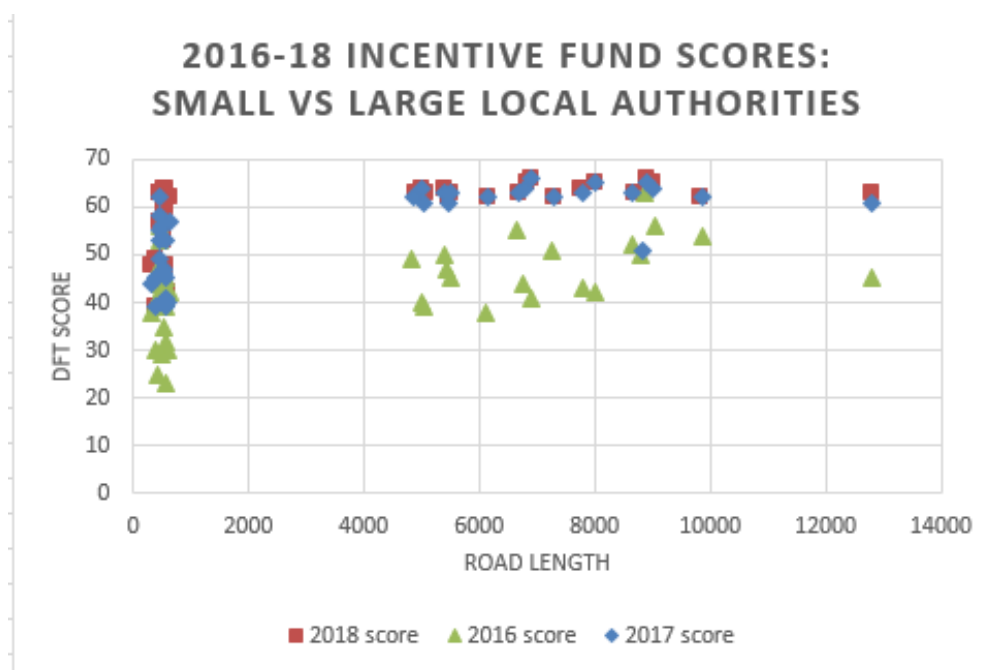


Figure 12: Graph of road length vs DfT overall score

It is clear from the graph above there is less range in the RL of small LAs compared to large LAs. The smallest LAs oversee a road network with RL ranging from around 400 to 600km compared to the largest LAs that oversee a network with RL ranging from 5000 to 10,000km, with Devon the largest LA overseeing just over 12,000km. Although the graph above looks at DfT overall score, the raw data highlights that the frequency of Band 3 (the highest DfT Band) is higher in the top 20 percentile of LAs by RL compared to the bottom 20 percentile of LAs in line with what the graph shows for DfT overall score.

In all years, there is a lot of clustering for the small LAs suggesting they are of a similar sized RL. However, despite this apparent similarity in RL, the range for small LAs is greater than the range for large LAs. There appears to be a lot more dispersion in the RL of large LAs ranging from around 4500km to approximately 13000km, suggesting that a one unit impact of RL can have a bigger impact on the DfT score for some of the largest LAs compared to the smallest LAs. The DfT overall score ranges from 22 to 66.

Over time, we can see a general improvement in DfT score for all LAs. Note the DfT overall score ranges from 22 to 66 and, in 2016, only one LA (a large LA) considered in the graph scored above 60. Despite an upward trend over time for the number of LAs achieving 60+, it does appear that small LAs are in the minority here compared to large LAs. Indeed, by 2018, all the large LAs have obtained a DfT score above 60 suggesting that LA size, as measured by RL, gives LAs an advantage regardless of how well LAs have performed in terms of any outcomes. That is, there is improvements over time but the differences in terms of small vs large LA performance in the DfT scores still persists.

4.4 Incentive data and variables

This sub-section considers three outcome areas: efficiency, road conditions and public satisfaction. In Chapter 3, Sections 3.5, 3.6 and 3.7 provided the generic background to the highways data from the NHT, CQC and DfT respectively. This sub-section details how all of this data comes together for the analysis on incentivising LAs and account for satisfaction with highways. Further, the rest of this chapter provides granular level detail on the specific details of the DfT (2016) Incentive Fund data, in relation to this analysis.

A collated dataset was formed by bringing together these aforementioned data sources (DfT, NHT and CQC) and is summarised in the table below. Also, in this sub-section, there is an explanation of the terminology found in the dataset and used throughout this chapter, such as, the difference between DfT bands, scores and strands. The focus, for the most part, is the DfT (2016) Incentive Fund data that underpins this research chapter.

Table 6: Collated dataset key features

Aspect	Detail
No. of local authorities	113 (N=339)
Years	2016-18 (3 years)
Dependent variables	DfT Incentive Fund strand score or overall score
Independent variables	Efficiency outcomes from CQC, road condition data from DfT and NHT satisfaction outcomes
DfT Incentive Fund	22 questions, 5 strands, 3 Bands
Exclusions	Excludes London and LAs with highways maintenance PFI

Source: own summary of collated dataset.

Of these 113 LAs, 31 LAs are devolved LAs meaning a transfer of powers to the local level. Devolved LAs (as listed in Appendix 4) automatically receive the highest DfT incentive funding. While data from the DfT self-assessment exists for devolved LAs, the argument is that devolved LA data may not be as robust, compared to non-devolved LA data. However, by excluding devolved LAs, 93 observations are omitted so there is an argument for including devolved LAs but indicate it with a devolved LA dummy variable.

4.4.1 Incentive Fund - dependent variables

There are three possible dependent variables: overall DfT score (range 22 to 66), strand score (such as, customer score) and the DfT Band (1 to 3, where 3 is the highest Band) (DfT, 2016). Recall, from Section 3.5, the five strands are as follows: asset management, operational services delivery, resilience, customer and benchmarking. The scores from these strands lend themselves to a Band that indicates greater maturity with a move from Band 1 (little or no maturity) to Band 3 (very good to excellent) determining the amount of highways incentive funding that an LA receives. As indicated in the table above, there are a few exemptions to the DfT (2016) Incentive Fund, but 113 LAs are part of the fund.

While the different Bands of Band 1, 2 or 3 reflect a greater level of maturity by LAs to attain a higher Band (DfT, 2016), there exists problems trying to analyse the categories. Firstly, as seen from Figure 12, there is a tendency for clustering in the data, which only becomes more pronounced at the discrete Band level. Secondly, it can be hard to assess LA performance given Band 1, 2 and 3 can be said to be synonymous with low, average and high, respectively. Finally, as mentioned already, devolved LAs automatically gain Band 3; there is richer analysis from looking at the DfT scores, instead of the DfT Bands.

The DfT (2016) score is a cardinal variable available at different hierarchies and, given its range, can be considered as broadly continuous, rather than discrete. At the top level, there is an overall score out of 66 so most closely associated with Band data. Although, it is possible for LAs to receive a score of 64 out of 66 and still obtain the lowest Band of Band 1. However, the higher overall scores tend to be synonymous with a higher Band.

Although we possess data on overall DfT (2016) score and DfT Band (latter determines the amount of incentive funding LAs obtain), these are aggregate level and hide uneven performance across strands. However, there is value in undertaking an overall score analysis to attain the 'big picture'. As such, the table below summarises the descriptive statistics for overall score. These are for the three years combined (2016-2018) as per this thesis, each individual year of analysis and the latest year of the DfT data (2020/21).

Table 7: Descriptive statistics for score overall and by year

Overall score	Mean*	SD*	Min*	Max*	Mode*
2016 to 2018	52	10.583	23	66	63
2016/17 only	43	7.996	23	65	41**
2017/18 only	53	8.939	28	66	62
2018/19 only	59	8.319	34	66	63
2020/21 only (not in analysis)	63	2.478	50	66	63

Source: DfT (2016). 2016/17 etc. relates to year of submission and not the year that evidence is based upon. *These figures exclude the devolved LAs that do not attain a score. **This mode is low, but in 2016/17 only 2 LAs attained Band 3 with 24 LAs in Band 1 compared to 2017/18 with 39 LAs achieving Band 3 but only 4 LAs falling into Band 1. Min and max are around 30 and 66 respectively, as the overall score range is 22 to 66.

The analysis of DfT (2016) Incentive Fund data spans three consecutive years 2016-18, which is not publicly available. At the time of thesis submission, a further year of data, for 2020/21 has now been made publicly available. There is then a potential to extend the 2016 to 2018 analysis to cover the latest available data, which is the last year of the DfT Incentive Fund. However, there are two reasons (and other reasons not outlined here) for restricting the DfT analysis to the early years of the DfT (2016) Incentive Fund.

Firstly, as seen in the table above, the performance gap between LAs closes over time if considering overall DfT (2016) score. There were few LAs that achieved anything less than the highest of Band 3 in 2020. Secondly, the 2020/21 Incentive Fund also included some non-scorable questions on sustainability to inform the future of the Incentive Fund. As these questions were non-scorable, it is possible to compare 2020 with the earlier years. Yet, it would seem that LAs are getting better at evidencing for the DfT Incentive Fund and not necessarily improving per se. This is corroborated by the conscious decision of an LA to just obtain Band 2 as the cost of attaining Band 3 would outweigh any incentive funds (cost-benefit analysis).

4.4.2 Background to the DfT strand scores

Alongside undertaking an overall score analysis, the aforementioned five strands from the DfT (2016) self-assessment form the dependent variable. There are outcomes, that form our independent variables, to assess whether or not the DfT incentive funding is associated with good outcomes in practice. The outcomes, found in the collated dataset, were sourced from NHT and CQC and are detailed in Sections 4.4.3 to 4.4.5 inclusive.

A sub-level of overall score is the total score for each of the five strands (referred to as strand scores throughout) that are as follows: asset management, resilience, customer,

benchmarking and operational services delivery (DfT, 2016). As there is an uneven distribution of questions among the strands, it is logical to use total for the strand scores rather than an average. The table below has the descriptive statistics for strand scores.

Table 8: Descriptive statistics for DfT strands

Dependent variable	Range of available data	No. of Q's	Mean	SD	Min	Max	Mode
Asset management	8 to 24	8	18.563	4.271	8	24	16
Resilience	3 to 9	3	6.994	1.766	3	9	9
Customer	3 to 9	3	7.286	1.585	3	9	9
Benchmarking	2 to 6	2	4.528	1.214	2	6	6
Operational services	6 to 18	6	14.307	2.837	7	18	17

Source: DfT (2016).

There are five strands in the DfT (2016) Incentive Fund, with the percentage frequency of top strand scores summarised below. This shows scores that are three away from the top score as this was felt to be challenging yet realistic. As such, LAs that receive over 50% of the score in the benchmarking strand are included in the table below. Whereas with the Resilience and Customer strand, for inclusion, their inclusion in the table means that LAs are only achieving at minimum two thirds of the maximum available score. The discrete nature of strand scores means that choosing three away from the top might be easier than trying to identify the frequency of LAs in, say, the top 20% as that gives a continuous number to serve as a threshold. This means that ultimately, for example, a 5.4 would essentially mean a score of 6 or above so the bar would be a little higher.

However, we are interested in proximity towards maximum score, rather than comparing if LAs are reaching the upper scores for each strand, and so we use three from the top.

Table 9: DfT strand scores by frequency of proximity to upper limit

Strand	Q's	2016	2017	2018	2016-18
% Freq of Asset scores >21 (max 24)	8	3.5%	37.7%	68.4%	36.4%
% Freq of Resilience scores >6 (max 9)	3	29.6%	64%	87.7%	60.3%
% Freq of Customer scores >6 (max 9)	3	25.2%	69.3%	85.1%	59.8%
% Freq of Benchmarking scores >3 (max 6)	2	57.4%	84.2%	89.5%	77.0%
% Freq of Operations scores >15 (max 18)	6	7.8%	43.9%	70.2%	40.5%
N (Q's or LAs)	22	115	114	114	343

N.B. LAs receive at least Level 1 (a point towards total score) for each question - lowest total score is two for the Benchmarking strand with two questions. Source: DfT (2016).

The table above shows proximity towards the maximum score increases over time (DfT, 2016). Especially, in the case of the Resilience, Customer and Benchmarking strands with frequency around 85% in 2018. The scores are naturally truncated at the lower end i.e., never zero. It is however possible for LAs to achieve the maximum score in a strand.

Each of the DfT (2016) strand scores were used to estimate regression models (see Results section). The table above is a useful reference to assess how close the constant is to the maximum score. The constant shows the score LAs would reach if all of the independent variables were zero so a good indicator of the usefulness and the influence (if any) of explanatory variables. Thus, it is helpful to see if better outcomes are positively related to the LA scores for each of the DfT strands, as explored in Section 4.6.2-4.6.3.

Having covered the dependent variable and the form this could take, the next sub-section moves away from the DfT (2016) data to other data, as the latter is where the outcomes are derived. These outcomes, that become the independent variables, are determined by the DfT strand that is being regressed upon. In Section 4.5.3 later, the three equations then illustrate how a given dependent variable translates to the most suitable outcomes.

4.4.3 Independent variables – CQC efficiency

All the independent variables are summarised in Table 12 later in this sub-section. This summary of independent variables is complemented by a detailed definition for each of the outcomes. The remainder of this Section 4.4 covers the various highway outcomes.

CQC efficiency rating (Eff): This rating is only available for those LAs that are members of the CQC efficiency network (NHT Network, 2017). It highlights the potential cost savings that LAs can make without a loss of quality (see Figure 9 for an illustration). For example, if an LA is 86% efficient, it is possible for that LA to reduce costs by 14% whilst maintaining network size and without compromising on quality. Thus, a CQC efficiency rating of 1 would indicate a total absence of any inefficiency. The CQC efficiency rating is a percentage that was formatted as a decimal, such as, .96 for a 96% efficiency rating.

The CQC efficiency rating is a benchmarking measure of the extent to which an LA can reduce its cost whilst still maintaining the same quality of infrastructure maintenance (NHT Network, 2017). The greater the rating the more efficient an LA is, given there exists less scope for savings. Hence, a higher CQC efficiency rating is expected to be associated with higher scores on the DfT efficiency strand. The CQC efficiency rating is

expressed as Total Expenditure (Totex) so Capital Expenditure (Capex) plus Operational Expenditure (Opex) (defined below). The Totex less investment form is used for analysis.

Table 10: Capex and Opex definitions

Capex [capital expenditure]	“Is anything that adds life to the asset, e.g. extends how long it can provide serviceability. This includes any resurfacing treatment or reconstruction including for example resurfacing, surface dressing, programmed patching (not reactive patching to fix urgent defect or failures in the road surface or reactive type patching on a localised area). Also, includes any micro asphalt, rejuvenation (recycling) or re-texturing.”
Opex [operational expenditure]	“Is anything ad-hoc or reactive in nature to maintain serviceability. This includes CAT 1 defect repairs, any ad-hoc generated patching such as in response to safety inspections, public enquiries, accident damage or defects the local inspection team have seen – generally only done on a local basis in response to something rather than having planned.”

Source: NHT Network (2017: 19).

Change in the CQC efficiency rating (DEff): A change variable is useful for showing improvement over and above absolute ratings. This change is either positive or negative depending on if efficiency has improved or not from the previous year (NHT Network, 2017). If an LA is efficient, then DEff highlights whether that efficiency was maintained and/or also provides a way to assess efficiency improvements for LAs that may have a lower CQC Eff rating. In other words, the change in efficiency rating complements (and may be better than) a level efficiency rating as it showcases ‘top performers’ i.e., those who improved the most, rather than just those LAs who were already efficient at the start.

Save (realised savings): This is the savings made per annum relative to 2013/14 and is a measure of the savings realised over a number of years (NHT Network, 2017). It is another CQC variable so only available for LAs in the CQC network. Yet, realised savings differs from Eff and DEff variables as it shows the medium term changes (so a positive).

The realised savings variable was not used in our analysis but defined here to recognise that there was an alternative efficiency-related measure. The reason was that it assess performance relative to 2013/14, which does not show if an LA has improved from the previous year. If the base point was aligned with the DfT (2016) Incentive Fund, it would have at least highlighted savings realised, relative to the start of the DfT Incentive Fund.

4.4.4 Independent variables – road measures

There are three different road measures considered as the independent variables. These measure are road condition red or amber (level measure), change in road condition and road length. The latter is not an outcome but still included to account for the size of LAs.

Road Condition (RDC) red: RDC red denotes the percentage of the road network that is in need of repair (DfT, n.d.). It is obtained from the DfT and is available as aggregate or by road type. A lower RDC is synonymous with a better road network (and vice-versa). Thus, the better performing LAs would be expected to have better road condition/RDC.

DRDC (change in RDC red): DRDC red (also referred to as just DRDC) is the change in RDC red from the previous year (DfT, n.d.). It is also possible to obtain DRDC amber

though the reduced coverage of DRDC amber limits the sample size. Again, DRDC is available by road type, but we have gone for an overall measure.

An advantage of a change 'D' measure is that, unlike with level measures, it does not just measure if LAs have good or bad road condition. This allows LAs to be assessed on improvement/deterioration and so can be a valuable measure of outcome performance. A change measure denotes the direction (better or worse) and the extent of magnitude.

Road Condition (RDC) amber: RDC amber is the percentage of the road network that will soon require maintenance (i.e., LAs should keep an eye on it but no action is currently needed) (DfT, n.d.). As with RDC red, the RDC amber is available by road type though is sparser in coverage particularly for the U roads. Thus, an aggregate RDC red is used.

The RDC amber measure is a valuable measure but LAs need RDC red and RDC green to provide context (DfT, n.d.). For example, RDC amber 30 says little about the split of the remaining 70 in terms of whether there is more red or green on the road network. As mentioned in Section 3.7.2, amber roads are used by LAs to justify doing a closer inspection, so is perhaps an internal measure and not an external performance measure.

Road Length (RL): the a priori expectation of road length was that it would have little/no relationship with DfT (2016) Incentive Fund scores. As per prior LTPs, the expectation was that the playing field would be level. However, following visual analysis (as in Figure 12) the expectation is now that there is expected to be a positive relationship between RL and DfT results. That is, larger LAs will score higher than smaller ones. This is not to say that larger LAs are the 'best', but to recognise that they possess more resources to devote to collation of evidence and/or attaining new evidence for the DfT Incentive Fund.

4.4.5 Independent variables – NHT satisfaction

The NHT Network (2018) survey asks, “How satisfied or dissatisfied are you with each [specific aspect] of these locally...?”. The responses span a five point Likert scale. With Very Satisfied (VS), Fairly Satisfied (FS), Neither Satisfied/Dissatisfied (neutral), Fairly Dissatisfied (FD) and Very Dissatisfied (VD) and a ‘Doesn’t Apply/Don’t know’ response.

$$\text{Satisfaction score} = \frac{\text{Weighting of Likert scale responses}}{\text{Count of the Likert scale responses}} = \text{Eq. 2}$$

$$\frac{(n(VS)*4 + n(FS)*3 + n(neut)*2 + n(FD)*1) + n(VD)*0}{n(VS) + n(FS) + n(neut) + n(FD) + n(VD)}$$

where n is the frequency of responses and large numbers translate to higher satisfaction.

In total, five satisfaction measures from the NHT (2018) satisfaction survey were made available for analysis. Each satisfaction measure covers a different satisfaction aspect, such as, speed of repair or quality of repair. These are either Highways Maintenance Benchmarking Indicators (HMBIs) or Key Benchmarking Indicators (KBIs). If change in satisfaction is factored in, then it potentially means 10 satisfaction variables for analysis. The expectation is that higher satisfaction is a better. As before, the change ‘D’ measure might be better to gauge performance improvements as LAs have differing satisfaction.

There is a public satisfaction dependent variable (referred to as PubSat1 in this thesis) used for analysis later. This was calculated from the NHT (2018) satisfaction survey for Q6.1 Condition of road surfaces. Although PubSat1 is satisfaction with condition of road surfaces, this is not the same as satisfaction with RDC. PubSat1 stems from the public perception of the condition of roads rather than the public having knowledge in terms of

the DfT red/amber/green makeup of local roads. Thus, PubSat1 and DPubSat1 indicate perceived quality of road conditions but not some performance-expectations differential.

The table on the next page summarises the aforementioned outcome variables in terms of: variable name, abbreviation, type, data source and brief definition. If needed, this allows readers to refer back to this table to obtain information on variables.

Table 11: Outcome definitions

Outcome	Abb.	Type	Data	Variable Definition
<i>Efficiency / road measures</i>				
CQC efficiency rating	Eff	Efficiency / value for £	CQC	How much LA can reduce its cost and maintain the same quality
Change in CQC efficiency	DEff	Efficiency / value for £	CQC	Change in CQC efficiency rating from the previous year
Road Condition red	RDC red	Road quality	DfT	The percentage of the local road network in urgent need of repair
Change in Road Condition red	DRDC	Road quality	DfT	Change in RDC red from the previous year
Road condition amber	RDC amber	Road quality	DfT	The percentage of the road network requiring maintenance soon
Road length	RL	Size / scale	DfT	RL in KM that local highway authority oversee
<i>NHT satisfaction measures</i>				
Condition of road surfaces	PubSat1	Satisfaction	NHT	Satisfaction with condition of road surfaces (HMBI01 in survey)

Change in PubSat1	DPubSat1	Change in satisfaction	NHT	Change in satisfaction with condition of road surfaces (DHMBI01)
Speed of repair	PubSat2	Satisfaction	NHT	Satisfaction with speed of repair to damaged roads/pavements (HMBI07 in survey)
Change in PubSat2	DPubSat2	Change in satisfaction	NHT	Change in satisfaction with speed of repair (DHMBI07)
Quality of repair	PubSat3	Satisfaction	NHT	Satisfaction with quality of repair to damaged roads/pavements (HMBI08 in survey)
Change in PubSat3	DPubSat3	Change in satisfaction	NHT	Change in satisfaction with quality of repair (DHMBI08)
Deals with potholes	PubSat4	Satisfaction	NHT	Satisfaction with how LA deals with potholes and damaged roads (HMBI13 in survey)
Change in PubSat4	DPubSat4	Change in satisfaction	NHT	Change in satisfaction with how an LA deals with potholes and damaged roads (DHMB13)
Condition of highways	PubSat5	Satisfaction	NHT	Satisfaction with the condition of highways (KBI23 in survey)
Change in PubSat5	DPubSat5	Change in satisfaction	NHT	Change in satisfaction with condition of highways (DKBI23)

This sub-section has detailed all the variables used for the DfT (2016) Incentive Fund analysis. It is worth mentioning that there are also dummy variables included in some of the models. Across all models, there are year dummy variables for 2016/17 and 2017/18. In some models, the devolved dummy variable (devolved=1) indicates the presence of a devolved LA. Recall, devolved LAs automatically obtain their maximum allocation of the Incentive Fund so may not be as 'incentivised' as the non-devolved LAs whose Incentive Fund amount depends on self-assessment. The devolved LAs are listed in Appendix 4.

4.4.6 Descriptive statistics and data alignment

Having defined the dependent variables and independent (outcome) variables, this sub-section summarises descriptive statistics of these variables and looks at data alignment. The table below is solely the descriptive statistics for the independent variables, as the descriptive statistics for the dependent variable are found in Table 7 and Table 8 earlier. This is followed by a table on the alignment of data. Prior to these two tables, there is an explanation of the need to align data and how this was borne out in our collated dataset.

As the impact of outcomes are being assessed, it is clear, for example, that the 2016 outcomes will not necessarily come to fruition in the 2016/17 DfT Incentive Fund data. The timings of the DfT (2016) Incentive Fund means that LA submission takes place in the December of the year preceding the results. In other words, for example, 2016/17 DfT Incentive Fund data has been determined by evidence provided in December 2015. This means there is a need to align the data across the different sources. The table below considers how this alignment of data differs according to whether an outcome is either a level variable (non 'D' measure) or a change variable ('D' measure) being considered in relation to a particular year of DfT data.

Table 12: Descriptive statistics for independent variables

Variable	Obs.	Units	Mean	SD	Min	Max
Eff	248	0.01	.882	.114	.262	1
DEff	243		-.001	.090	-.545	.502
RL	449	KM	1969.039	2416.75	34.5	12813.9
RDC red	323	%	12.331	6.974	1.202	64.752
DRDC red	309	%	-.245	3.258	-12.652	17.331
RDC amber	255	%	25.977	8.253	10.757	96.953
PubSat1	242	%	38.721	6.881	19.234	59.832
DPubSat1	197	%	1.717	4.610	-8.231	19.846
PubSat2	239	%	31.244	5.359	17.827	43.687
DPubSat2	194	%	1.295	3.605	-5.956	15.098
PubSat3	239	%	37.927	5.364	22.245	51.711
DPubSat3	195	%	.925	3.473	-6.875	15.290
PubSat4	240	%	36.134	5.944	18.725	50.798
DPubSat4	190	%	1.185	4.019	-7.960	16.709
PubSat5	236	%	36.560	6.228	19.137	50.816
DPubSat5	193	%	1.133	4.885	-7.373	36.768

Source: own summary of data from DfT (2016).

Table 13: Alignment of data by DfT year

DfT strand by year	NHT	CQC
2016/17	2015 non 'D' measure	2016
Determined Dec 2015	D measure 2015 minus 2014	CQC efficiency, savings
2017/18	2016 non 'D' measure	2017
Determined Dec 2016	D measure 2016 minus 2015	CQC efficiency, savings
2018/19	2017 non 'D' measure	2018
Determined Dec 2017	D measure 2017 minus 2016	CQC efficiency, savings

4.5 Method: model determination

Having outlined the data available for the study in the previous section, this sub-section covers the method used. Specifically, this section considers the statistical method used to explore the DfT Incentive Fund scores in relation to performance outcomes and other factors (such as, road length). The use of linear regression techniques is valid, given the continuous nature of Incentive Fund scores and how it translates to variables.

Sections 2.7.1 and 2.7.4 have provided background on the generic regression method used in this chapter. This Section outlines the specific details of this method for analysis. Prior to this, the pros and cons of the DfT overall score vs strand score are highlighted and is followed by the variable selection.

4.5.1 DfT overall score vs strand score

As the DfT Band is discrete, information about performance would have been hidden by using DfT Band and the scores provide more granular information. Hence, in terms of modelling, there are two dependent variables: overall score and strand score. Both are

analysed with the form of the dependent variable varying. The table below summarises the pros and cons of overall score vs strand score, as the different modelling strategies.

Table 14: Pros and cons of modelling strategies

Strategy	Advantages	Disadvantages
Overall score	Dictates funding – where the incentives lie Greater variation in dependent variable	Does not identify uneven performance Need larger number of outcomes to describe various aspects of performance (generic outcomes)
By strand	Identifies uneven performance Fewer number of outcomes required (can be specific)	Does not determine amount of incentive funding Less variation in the dependent variable

Source: own summary based on DfT (2016).

Having outlined the pros and cons of modelling strategies, the next sub-section provides the rationale for the form of the dependent variable. The next sub-section also outlines the variable selection process. This is followed by sub-sections on regression analysis and model determination to lead onto Section 4.6 on Results and Discussion of analysis.

4.5.2 Variable selection

The overall DfT (2016) score variable provides an aggregate variable that is one form of the dependent variables considered in our analysis. The overall score ranges from 22 to 66 so there is greater disparity in the overall score results among LAs, when compared to the smaller range found with DfT strands. By using overall score, an ‘everything taken

into account' score is used from the DfT (2016) Incentive Fund. The benefit of this is that highways aspects, such as, asset management among others, are factored into DfT overall score.

However, the dependent variable we focus on is DfT strands. These strands translate to five different dependent variables: asset management, resilience, customer, benchmarking and operational services delivery. Within each strand, are a number of different questions so, for example, the customer strand has three questions with one each on feedback, satisfaction and information. It is possible for LAs to achieve a score of 1, 2 or 3 on each question with 3 indicating the 'best' score. Hence, all of the strand dependent variables are discrete data and truncated at an upper level.

The candidate variables were outlined in Section 4.4 earlier. The pool of independent variables is partly about the availability of variables. Although, thought went into how best to relate outcomes to the different strands.

While theory and experience are both worthwhile, these aspects only provide a general viewpoint of possible candidate variables worth considering for the regression model (NCSS, n.d.). Note, this reference is for stepwise regression but an established generic to specific modelling approach is used for quantitative analysis later. From the pool of candidate variables, the variable subset in the final regression model is justified by data analysis. This process of finalising the variable subset is the variable selection problem.

The variable selection process is an established methodology to obtain a parsimonious model with the right balance between a simple model (fewest number of regressors) and model fit (having just enough regressors) (NCSS, n.d.). The selection problem is then one of expressing the regression model as completely and realistically as possible while

including the fewest number of relevant regressors required for precision and simplicity. Various strategies exist to refine models but in this thesis a backward stepwise is coupled with a sense check to ensure that the estimated coefficient signs and sizes are plausible.

4.5.3 Regression analysis

Using a backward stepwise regression (or backward elimination) process as a starting point, the OLS regression models started general and then became specific. With the OLS regression method, both overall score and strand score were considered though the focus is on the latter for brevity. There was an assessment of time through the year dummy variables. Road length as a size variable is in regression models, given previous literature indicated an advantage of the prior LTP funding was a level playing field where all LAs were equally able to access the higher levels of funding, regardless of their size.

Having considered the possible dependent variable and outlined the process of variable selection, the various models executed using regression analysis can be simplified into the three equations below. This precedes the sub-section on model determination next. The dummy variables are year variables (2017 and 2018) and LA type (devolved or not).

$$\begin{aligned} \text{Overall score}_i = & \beta_0 + 2017_i + 2018_i + \text{Devolved}_i + \text{RL}_i + \text{Eff}_i + \text{DEff}_i \quad \text{Eq. 3} \\ & + \text{RDC red}_i + \text{DRDC red}_i + \text{RDC amber}_i + \varepsilon_i \end{aligned}$$

With an individual index (i) for each LA $i=1, \dots, 113$, devolved only found in model (c) variations and ε_i as an error term for unobserved heterogeneity and idiosyncratic factors. The overall score is from the DfT Highways Incentive Fund, and it ranges from 22 to 66.

An overall score is comprised of strand scores, for which the equations are given below.

$$\begin{aligned} \text{Strand score}_i = & \beta_0 + 2017_i + 2018_i + RL_i + Eff_i + DEff_i + RDC\ red_i \quad \text{Eq. 4} \\ & + DRDC\ red_i + RDC\ amber_i + \varepsilon_i \end{aligned}$$

With an individual index (i) for each LA $i=1, \dots, 113$ and ε_i as an error term for unobserved heterogeneity and idiosyncratic factors. Strand score is the score for asset management, resilience, benchmarking or the operational services strand from the DfT Incentive Fund.

$$\begin{aligned} \text{Customer}_i = & \beta_0 + 2017_i + 2018_i + Devolved_i + RL_i + PubSat1_i \quad \text{Eq. 5} \\ & + DPubSat1_i + PubSat2_i + DPubSat2_i + PubSat3_i \\ & + DPubSat3_i + PubSat4_i + DPubSat4_i + PubSat5_i \\ & + DPubSat5_i \varepsilon_i \end{aligned}$$

With an individual index (i) for each LA $i=1, \dots, 113$ and ε_i as an error term for unobserved heterogeneity and idiosyncratic factors. Customer is the customer strand score from the DfT Incentive Fund. Again, devolved dummy variable is only in the model (c) variations.

Table 15: Mapping independent variables to scores

Aspect	Type 1	Type 2	Type 3
Dependent variable	Overall DfT score	DfT strand score excluding customer	DfT customer strand score only
Outcome variables	All the possible outcome variables	Efficiency variables only	Satisfaction variables only
Control variables	Road length, year dummy variables, RDC red/amber	Road length, year dummy variables, RDC red/amber	Road length and year dummy variables only
Model variations	Devolved dummy variable, excluding devolved LAs	Devolved dummy variable, excluding devolved LAs	Devolved dummy variable, excluding devolved LAs
Other variations but not in thesis	N/A	Realised savings replaces efficiency	N/A

Model numbers	Model 1 and 2	Models 3 to 10	Model 11 and 12
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Source: own summary of analysis based on DfT (2016).

There were a priori expectations that some independent variables are associated with certain strands of the DfT (2016) Incentive Fund. The independent variables fall into three categories: control variables, efficiency, and highways satisfaction. This is mapped out in Table 15 above and highlights how the above regression equations came about.

4.5.4 Model determination

To determine the final model, an iterative approach was used to execute the regression method that went general to specific. This method works by removing the independent variables one by one according to which has the highest p value (i.e., least significant) (a variation of stepwise, NCSS, n.d.). Each iteration meant responding to changes in p values as opposed to running a general full model and then letting the initial model dictate the order that variables are removed to reach the final model. Hence, it is an approach to a regression method that involves re-assessing statistical significance at each stage.

Recall, a specific model was obtained by eliminating the least significant variable (i.e., highest p value) one by one until all the variables were statistically significant (alpha less than 0.10) or left with a base model. This has two disadvantages: firstly, the tendency for R^2 to be higher if more variables are included in the models and secondly, potential collinearity may exist between variables. These drawbacks were overcome by executing prior correlation analyses that indicated where variables might measure the same thing.

The general to specific model determination was combined with a sense check and prior expectations as to the sign of variables that were most rational. For example, if the road network improves, then so does satisfaction (this applies to the Chapter 5 analysis too). Also, certain key variables were kept in all models, regardless of statistical significance. For example, road length (as indicator of size of LAs) and certain dummy variables too.

For the resilience models, a variation included considering satisfaction given the link between road condition and satisfaction indicated from the NHT satisfaction survey. These satisfaction outcomes were added in pairs noting which outcomes were statistically significant. The statistically significant satisfaction outcome from each model was put together into one model and then variables eliminated individually according to the least significant one.

For all models, there was a need to account for path dependency by taking the final model then adding in previously removed outcomes one by one and checking they were still statistically insignificant. This ensured that the sequence of omitting least significant variables did not affect the final model obtained. Across all the models, it was found the resulting final model remained the same final model, which means the method is robust.

4.6 Results and discussion

This Results and Discussion section is structured into four main parts: overall score, strand scores associated with efficiency, customer strand scores and summary. The models are presented separately according to their dependent variable. This translates to six results tables: one for DfT overall score and one for each of the five strand scores.

For a coherent results section, only the general and specific models are outlined. The odd numbered models are general models and even numbered models are specific models. Recall, from the Data section earlier in this chapter, the 'Save' variable was included in preliminary models instead of efficiency outcomes. However, for brevity, only the results of model variations with efficiency outcomes are presented in this sub-section.

There also exists (a), (b) and (c) model variations for the overall score and strand scores. The variations arise depending on whether devolved LAs are included in the model (a), omitted (b) or indicated via a devolved dummy variable (c). Recall, this is due to the fact that the devolved LAs automatically obtain the maximum amount of DfT incentive funds.

4.6.1 Overall score results

In the first instance, the results for DfT overall score are presented below. For this model, all of the possible outcomes are included, given that this overall score encompasses all five strands. The rationale is to initially test for an association between overall score and outcomes before exploring an association between strand scores and specific outcomes.

It may be noted there is an absence of satisfaction outcomes in the overall score. Given the number of satisfaction outcomes, the idea was to analyse the relationship between satisfaction outcomes and the DfT satisfaction strand score to identify which satisfaction outcome(s) is/are most suitable for inclusion in an overall score analysis. However, as seen later, there was little relationship between satisfaction and its strand score. Hence, an absence of satisfaction outcomes in the results for overall DfT score, as in table below. The non-linear form was not tested, given the precedent for a linear form in the literature.

Table 16: Overall score (range 22 to 66) model variations

Variable	Model 1(a)	Model 1(b)	Model 1(c)	Model 2(a)	Model 2(b)	Model 2(c)
Constant	39.926	29.562	38.399	38.017	39.816	38.605
2017 year dummy	10.419 (.000)	10.977 (.000)	10.432 (.000)	9.936 (.000)	10.947 (.000)	9.905 (.000)
2018 year dummy	15.951 (.000)	16.939 (.000)	15.955 (.000)	17.043 (.000)	17.597 (.000)	16.985 (.000)
Devolved dummy			-3.205 (.013)			-1.496 (.154)
RL	.001 (.000)	.0007 (.000)	.0009 (.000)	.001 (.000)	.0009 (.000)	.001 (.000)
Eff	-1.374 (.780)	7.059 (.161)	1.620 (.741)			
Deff	5.345 (.412)	-2.352 (.734)	4.278 (.508)			
RDC red	.183 (.071)	.274 (.026)	.229 (.028)	.211 (.011)		.220 (.009)
DRDC red	.125 (.417)	.086 (.647)	.115 (.452)			

RDC	.030	.165	.029		.074	
amber	(.694)	(.059)	(.679)		(.096)	
N	212	152	212	280	189	280
R squared	0.5570	0.6122	0.5722	0.5617	0.6011	0.5654

N.B. p value in parentheses, dependent variable is overall score. (a) original model, (b) model exc. devolved LAs (obtain max funding), (c) model inc. devolved dummy variable.

In the general model, the constant (intercept) for Model 1(b) that excludes devolved LAs is approximately 10 lower, which implies that keeping devolved LAs in the model inflates overall score but not so much in the specific model (Model 2(b)). This is corroborated by the devolved dummy that are negative in Models 1(c)/2(c) and statistically significant in Model 1(c) only. This suggests that, as we predicted, devolved LAs obtain lower scores on the DfT (2016) Incentive Fund perhaps as they automatically qualify for Band 3 so the maximum amount of incentive funding.

The 2017 and 2018 year dummy variables are positive and statistically significant across all the models. The magnitude for the 2018 year dummy is greater (15 to 17 compared to 9 to 10 for the 2017 year dummy) in line with the trend for an increasing number of Band 3 LAs. This suggests improvement over time and/or LAs learning what is required of them for the Incentive Fund. An improvement over time has been particularly the case for the larger LAs compared to small(er) LAs, hence, a result in line with the year results.

Road length, as a scale/size variable, is also positive and statistically significant in all the models. As the RL average is 1969, this means that on average in Model 1(a), for

example, RL increases overall score by .0011401 times 1969 which is 2.44 so an increase in overall score by 2 on average. The view is larger LAs have greater resources to dedicate to the DfT (2016) Incentive Fund compared to smaller LAs. Hence, it would appear, scale is an advantage.

The CQC efficiency rating does not appear in the final models, but the sign differs across the models with a negative coefficient in Model 1(a) but a positive coefficient in Models 1(b) and 1(c). Similarly, the change in CQC efficiency rating sign differs as it is positive in Models 1(a) and 1(c) but negative in Model 1(b). Although statistically insignificant in the models, efficiency and change in efficiency can be either positively or negatively associated with overall score.

Finally, considering RDC outcomes, they are consistently positive and statistically significant (RDC red) or statistically insignificant (DRDC) or only statistically significant in (a) variations (RDC amber) in all models. These are the only outcomes that appear in the final models: RDC red in Models 2(a) and 2(c) and RDC amber in Model 2(a). However, the sign for both variables are contrary to expectations suggesting that as RDC increases (so road network deteriorates), overall score also increases by .2 and .07 in Models 2/2(b) and Model 2(a) respectively. Thus, our analysis has evidence of worsening RDC being rewarded with higher incentive funding.

4.6.2 Strand score results excluding customer

The OLS regression models, as shown in the results table below, vary for three key reasons. Firstly, the dependent variable is the strand score so there are different models as the y variable changes. Secondly, the outcomes relate to each strand according to

the most likely association so, for example, satisfaction outcomes are only considered in customer models in the next sub-section. Finally, the type of outcomes means there are slight variations in the asset management, benchmarking, resilience and operational services models, that will then be analysed further.

In the interests of controlling for external factors, all the models include RL and the two year dummy variables in order to control for scale and time respectively. Our preliminary analysis of the DfT (2016) Incentive Fund indicated scale and time will be positively associated with the strand scores. Note that N varies across the different models, depending on outcomes included, but is still a large sample.

There are some consistent findings across all strands and models. The year dummy variables are positive and statistically significant showing an improvement in strand scores over time. RL is also positive and statistically significant hence larger authorities do better than smaller ones implying that, unlike with LTPs, the playing field is not even in this case so size matters. Generally, models have only one or no outcome independent variables in the final models. As with previous models, efficiency outcomes do not feature in most final models despite an apparent emphasis that exists on efficiency of highways.

For the model variations that include a devolved dummy variable to indicate 31 devolved LAs, this was negative but not consistently statistically significant across models and/or strands. Nevertheless, the suggestion is that devolved authorities score lower scores, in practice, than non-devolved local authorities. This can indicate whether or not devolved LAs participate fully in DfT (2016) Incentive Fund as they automatically obtain the maximum incentive funding from the DfT.

Table 17: Asset management (range 8 to 24) model variations

Variable	Model	Model	Model	Model	Model	Model
	3(a)	3(b)	3(c)	4(a)	4(b)	4(c)
Constant	14.151	10.281	13.537	13.528	14.113	13.688
2017 year	4.128	4.485	4.134	3.867	4.142	3.858
dummy	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
2018 year	6.227	6.738	6.229	6.619	6.689	6.603
dummy	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Devolved			-1.290			-.408
dummy			(.014)			(.361)
RL	.0004	.0002	.0002	.0004	.0004	.0004
	(.000)	(.025)	(.004)	(.000)	(.000)	(.000)
Eff	-.871	2.670	.3339			
	(.657)	(.179)	(.870)			
DEff	2.938	-.203	2.508			
	(.267)	(.943)	(.350)			
RDC red	.064	.112	.083	.077		.080
	(.108)	(.021)	(.046)	(.029)		(.029)
DRDC red	.058	.044	.054			
	(.363)	(.595)	(.397)			
RDC	.032	.061	.032			
amber	(.219)	(.114)	(.189)			
N	212	152	212	280	246	280
R squared	0.5264	0.5684	0.5424	0.5046	0.4866	0.5063

N.B. p value in parentheses, dependent variable is asset management strand score. (a) original model, (b) model exc. devolved LAs and (c) model inc. devolved dummy variable.

Finally, in terms of outcomes, generally the independent variables were statistically insignificant. The final model across all strands tended to have no outcomes (i.e., generic) or RDC outcome(s) (positive sign) and/or CQC efficiency rating (negative sign) that are statistically significantly associated with strand scores. Now that we have considered the similarities across the DfT strands, let us examine each strand in turn beginning with the asset management strand score results shown in the previous table.

The Model 4 variations with dependent variable asset management strand score include a couple of the same variables as that of the Model 2 variations with dependent variable overall score. This suggests that the type of dependent variable does not influence final models, in this instance. Again, there is evidence of a negative association of devolved LAs with the dependent variable, given a positive and statistically significant year dummy variables and RL but a negative sign on the devolved LA dummy variable.

A key finding is the lack of outcomes in the final models. There is RL and RDC red, but these are not specific to that particular strand. It was expected efficiency outcomes may be statistically significantly associated with asset management strand scores. However, this is not the case, though efficiency and asset management are closely linked in reality.

The R^2 goodness of fit measure implies around 50% of the variation around the mean can be explained by any of the above asset management models. The limitation of the R^2 as a measure of fit is that it does not account for varying number of independent variables across models. Thus, it is an inappropriate measure of fit to compare models.

Having considered asset management, the next strand we look at is the benchmarking strand. Again, both the initial general models and final specific models are presented. This results in the table above, again, with the variations.

Table 18: Benchmarking (range 2 to 6) model variations

Variable	Model 5(a)	Model 5(b)	Model 5(c)	Model 6(a)	Model 6(b)	Model 6(c)
Constant	2.341	2.183	2.288	2.497	2.254	2.480
2017 year dummy	1.076 (.000)	1.107 (.000)	1.077 (.000)	1.060 (.000)	1.084 (.000)	1.060 (.000)
2018 year dummy	1.695 (.000)	1.722 (.000)	1.695 (.000)	1.676 (.000)	1.737 (.000)	1.676 (.000)
Devolved dummy			-.112 (.521)			-.091 (.567)
RL	.00007 (.005)	.00007 (.036)	.00006 (.040)	.00007 (.001)	.00006 (.011)	.00006 (.008)
Eff	1.541 (.027)	2.0001 (.014)	1.645 (.019)	1.281 (.007)	1.583 (.002)	1.350 (.005)
DEff	-.093 (.903)	-.0006 (1.000)	-.1306 (.863)			
RDC red	-.001 (.932)	-.011 (.596)	.0003 (.981)			
DRDC red	.009 (.697)	.005 (.853)	.008 (.713)			
RDC amber	-.002 (.794)	.007 (.540)	-.002 (.791)			

Ns	212	152	212	248	181	248
R squared	0.4049	0.5590	0.4063	0.3970	0.4420	0.3979

N.B. p value in parentheses, dependent variable is benchmarking strand score. (a) original model, (b) model exc. devolved LAs and (c) model inc. devolved dummy variable.

In the benchmarking strand, the CQC efficiency rating appears in all final model variations (Models 6(a) to 6(c)) due to its statistical significance. The sign is positive, as expected, suggesting that a one unit change in CQC efficiency rating increases the benchmarking strand score. In this case, by 1.281, 1.583 and 1.350 for the Models 6(a), 6(b) and 6(c) respectively. This is not surprising given the CQC efficiency rating is about enabling benchmarking (comparisons) between different LAs. This implies the RDC outcomes are insignificantly associated with the benchmarking strand. Unlike the previous models, namely, asset management strand and overall score.

Benchmarking is not simply about LAs making the most realised savings but also efficiency in the sense of do more with less without compromising on quality. This is corroborated by a negative RDC sign suggesting that a one unit increase in RDC red (road network worsens) decreases the benchmarking strand score, albeit this is statistically insignificant at any conventional level.

As the range for benchmarking strand score is only 4 (range 2 to 6), it implies it may be harder for LAs to attain huge increases in strand score for benchmarking compared to the other strands. As benchmarking only has two questions, for LAs to improve their score in this strand they must go from Level 1 to 2 or Level 2 to 3 in one or both questions. Whereas with the other strands, there is more scope to not do as well on some aspects

yet still attain a good strand score overall, given there are more than two strand questions to compensate weak performance on one or more other questions.

Table 19: Operational services (range 6 to 18) model variations

Variable	Model	Model	Model	Model	Model	Model
	7(a)	7(b)	7(c)	8(a)	8(b)	8(c)
Constant	10.320	7.581	9.975	10.616	10.086	10.741
2017 year	2.330	2.357	2.333	2.314	2.325	2.308
dummy	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
2018 year	3.664	3.905	3.665	3.987	4.055	3.974
dummy	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Devolved			-.724			-.318
dummy			(.052)			(.286)
RL	.0004	.0003	.0003	.0004	.0003	.0003
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Eff	.246	1.968	.922			
	(.860)	(.194)	(.503)			
DEff	.555	-1.071	.314			
	(.767)	(.580)	(.864)			
RDC red	.086	.110	.097	.073	.060	.075
	(.005)	(.003)	(.002)	(.004)	(.060)	(.003)
DRDC red	-.018	-.003	-.020			
	(.700)	(.954)	(.666)			
RDC amber	.008	.062	.008		.0430	
	(.791)	(.027)	(.785)		(.006)	
N	212	152	212	280	175	280

R squared	0.4800	0.5420	0.4906	0.4868	0.5151	0.4891
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N.B. p value in parentheses, dependent variable operational services strand score. (a) original model, (b) model exc. devolved LAs and (c) model inc. devolved dummy variable.

Moving on, in terms of operational services delivery (see table above) the final models are identical to the final models with realised savings instead of efficiency, although the latter is not presented here. This implies that it is perhaps less about the outcomes and more the strand that influences the final model. In other words, outcomes are not that closely linked to any one specific strand in the DfT (2016) Incentive Fund.

This conveys road condition outcomes are positively and statistically significantly associated with operational services strand score. All these models feature RDC red and with the (b) variations excluding devolved LAs also having RDC amber. This is expected as operational services is about sustainable procurement and collaboration with other LAs and/or utility companies to ensure the smooth operational delivery of local highways maintenance.

As with the benchmarking models, the resilience final models (in the next table) contain the CQC efficiency rating with exception of the (b) variation excluding devolved LAs. In Model 10(b), instead of the CQC efficiency rating, there is RDC amber as an outcome. In contrast to the benchmarking models, the negative sign of CQC efficiency rating indicates that a one unit increase in CQC rating decreases the resilience strand score.

Table 20: Resilience (range 3 to 9) model variations

Variable	Model 9(a)	Model 9(b)	Model 9(c)	Model 10(a)	Model 10(b)	Model 10(c)
Constant	7.500	4.635	7.285	7.099	5.077	7.020
2017 year dummy	1.544 (.000)	1.666 (.000)	1.546 (.000)	1.537 (.000)	1.661 (.000)	1.536 (.000)
2018 year dummy	2.214 (.000)	2.389 (.000)	2.214 (.000)	2.249 (.000)	2.597 (.000)	2.252 (.000)
Devolved dummy			-.452 (.096)			-.427 (.087)
RL	.0002 (.000)	.00007 (.093)	.0001 (.006)	.0001 (.000)	.00009 (.006)	.0001 (.002)
Eff	-2.404 (.022)	-.270 (.778)	-1.982 (.066)	-1.824 (.006)		-1.502 (.026)
DEff	1.536 (.236)	-.543 (.659)	1.385 (.290)			
RDC red	.014 (.524)	.037 (.128)	.021 (.358)			
DRDC red	.034 (.368)	.006 (.871)	.033 (.375)			
RDC amber	-.002 (.917)	.037 (.031)	-.002 (.905)		.0192296 (.030)	
N	212	152	212	248	189	248
R squared	0.3608	0.4129	0.3707	0.3506	0.4349	0.3598

N.B. p value in parentheses, dependent variable is resilience strand score. (a) original model, (b) model excluding devolved LAs, (c) model includes devolved dummy variable.

The resilience strand covers HMEP processes, such as, the Lean Review and Potholes Review (DfT, 2016). In this analysis, the implication is that these HMEP processes are not necessarily associated with efficient LAs in practice. This is not to say that these processes do not work but rather that they need to be put into practice/action some way.

4.6.3 Customer strand score results

As seen from the three equations earlier in this chapter, the customer strand differs from the models executed for the other DfT strands. The customer strand is a 'soft', intangible measure and it is not expected to be (as) associated with the given efficiency outcomes. In contrast, the other strands are more oriented towards efficiency and tend to fall into the 'hard', intangible measure/category. Thus, the customer strand is the only one with satisfaction outcomes (as these replace the efficiency outcomes used with the strand score models for non-customer strands).

The results are presented in the table below. Model 11 represents the generic model whereby all satisfaction outcomes have been included. This is followed by the Model 12 variations that are the specific models obtained from undertaking a general to specific regression method and testing for a path dependency.

As with the other strand models, the year dummy variables are statistically significant and show an improvement over time. The nature of the DfT (2016) Incentive Fund means this is improved processes for customer strand elements, not necessarily better results for customers. This could include, for example, a rise in the number of LAs participating in the NHT satisfaction survey, with no consideration given to NHT results in this Fund.

Unlike with the other DfT strand models, the devolved dummy variable for the customer strand is statistically significant. But, as with other models, the sign is negative for the devolved dummy variable. As devolved LAs automatically obtain the maximum incentive funding, a negative sign indicates they may expend less time and effort to achieve a high score. In other words, all their strand scores and overall score are non-scorable in reality.

Table 21: Customer strand (range 3 to 9) model variations

Variable	Model 11(a)	Model 11(b)	Model 11(c)	Model 12(a)	Model 12(b)	Model 12(c)
Constant	6.386526	6.898867	6.850593	5.596407	6.639905	5.844633
2017 year dummy	1.368539 (.000)	1.381782 (.003)	1.436751 (.000)	1.35213 (.000)	1.558748 (.000)	1.352398 (.000)
2018 year dummy	2.079999 (.000)	2.121185 (.000)	2.148014 (.000)	2.050431 (.000)	2.243082 (.000)	2.050817 (.000)
Devolved dummy			-.7032567 (.004)			-.6128673 (.000)
RL	.000184 (.000)	.0001482 (.000)	.0001463 (.000)	.0002289 (.000)	.0001601 (.000)	.0001958 (.000)
PubSat1	-.0961726 (.284)	-.1318277 (.149)	-.0966134 (.262)		-.1075161 (.036)	
DPubSat1	.015132	.0099609	.0113271			

	(.839)	(.904)	(.878)			
PubSat2	-.0210351	.0216923	.049213			
	(.797)	(.814)	(.508)			
DPubSat2	.0075043	-.0267909	-.0228773			
	(.926)	(.756)	(.756)			
PubSat3	.0036605	-.0110301	-.0095954			
	(.956)	(.878)	(.882)			
DPubSat3	.0652443	.0659567	.0792142			
	(.261)	(.282)	(.163)			
PubSat4	.0856918	.0568523	.0431433		.0976945	
	(.378)	(.603)	(.646)		(.092)	
DPubSat4	-.0769509	-.0174499	-.0549189			
	(.378)	(.821)	(.503)			
PubSat5	.0208382	.057853	.0099123			
	(.788)	(.470)	(.895)			
DPubSat5	.0096177	-.020817	.0133621			
	(.879)	(.753)	(.824)			
N	184	146	184	339	177	339
R squared	0.4023	0.4840	0.4369	0.4315	0.5331	0.4584

N.B. p value in parentheses, dependent var is customer strand score. (a) original model, (b) model exc. devolved LAs (obtain max funding), (c) model inc. devolved dummy var.

Only Model 12(b) has any satisfaction outcomes. These are PubSat1 (negative sign) and PubSat4 (positive sign), which are statistically significant at the 5% and 10% level, respectively. Even when it comes to public satisfaction, RL is statistically significant.

This corroborates the earlier sub-section on the impact of size in relation to the DfT (2016) Incentive Fund as well as other research that explores the relationship between size and satisfaction. In this instance, size is indicated by an RL variable. However, as in other research, size can cover land area (excluding land waters) that LAs oversee or population size that LAs are responsible for. The common factor, regardless of the size variable used, is the implication that there is perhaps an 'ideal' size with highways LAs.

4.6.4 Consideration of including devolved LAs

Generally, the final (a) and (c) Model variations are the same except the (c) variation includes a devolved dummy variable, which is statistically insignificant except in the customer strand. This implies that although the devolved dummy variable is useful, as the negative sign indicates the devolved LAs score lower on the DfT (2016) Incentive Fund, its insignificance means it is not needed in models. That is, the devolved dummy variable does not impact on final models in terms of the outcomes that remain in models.

Moving on to whether devolved LAs should be excluded, this very much depends on the dependent variable. With the benchmarking and resilience strands, excluding devolved LAs gives a final model that has the same, or same number of, outcomes as those including devolved LAs. Whereas with the remaining strands, excluding devolved LAs

either gives fewer outcomes (asset management strand) or more outcomes (operational services and customer strand) than final models including devolved LAs.

However, what is important to note is that N drops if devolved LAs are excluded. In the asset management strand, for example, model 8(a) has N=231 observations, which is lower than model 8(b) excluding devolved LAs with 246 observations. And 246 observations is not that much lower than the 280 observations found in model 8(c). Whereas in the customer strand, the difference in N across final models is the highest with 177 observations in model 12(b) excluding devolved LAs compared to the 339 observations in models 12(a) and 12(c). Hence, a decision as to whether or not devolved LAs should be omitted is perhaps best reached on a case-by-case basis for each strand.

4.7 Conclusions

In this analysis, there seems to be little/no statistically significant association between the DfT (2016) Incentive Fund scores and good highways outcomes. Hence, incentive funding appears to be more about quality process (what the DfT Incentive Fund appears to measure) as opposed to good performance on road quality, efficiency, or satisfaction measures (i.e., outcomes). A notable finding is that large LAs tend to obtain a greater score compared to small LAs, regardless of the outcomes achieved. From a policy perspective, this is a cause for concern as the DfT Incentive Fund does not seem to be associated with better outcomes, which would benefit the public and their LA satisfaction.

This chapter has assessed the association between DfT (2016) Incentive Fund results and outcomes using data on/from highway LAs in England during 2016-18. We executed regression models for numerous model variations. The aim was to assess whether or

not good performance on the DfT Incentive Fund was associated with good outcomes in reality. The specific conclusions from model variations, next, are followed by the overall conclusions. There is also thought around the future direction of the DfT Incentive Fund and the shape this could potentially take (as this DfT fund was only till the 2020/21 year).

The Eff/DEff variables are indicative of LAs doing more with less. Hence, it was felt that models should consider these separately in order to mitigate potential multi-collinearity. There is expected a positive association between Eff/DEff and non-customer strand scores as otherwise it could imply that there has been some reduction in quality resulting from increased Eff/Deff. For the most part, final models tend to exclude these variables.

For the benchmarking strand, all final model variations include Eff but not DEff. With the resilience strands, the final (a) and (c) model variations with devolved LAs include Eff (again DEff is absent in the final models). The sign on these variables are positive in the benchmarking strand (as expected) but negative with the resilience strand. As such, perhaps the discussion is less about a preferred model and more about a preferred strand. Thus, in this case, benchmarking might be preferred for an efficiency association.

The findings obtained are robust given consistent findings across different dependent variable (strand) and model specifications. There is a tendency for models to converge towards the same final model implying that the specific dependent variable (strand) used does not influence association with outcomes. The exclusion of devolved LAs provides varying results compared to the same models with devolved LAs. This is accounted for by estimating the models both with and then without devolved LAs to ensure robustness.

This consistent negative sign on the devolved dummy variable is pertinent given that the DfT (2016) Incentive Fund has, at the time of writing, reached its initial five year span of 2016-2021. At the time of thesis submission, there is uncertainty over whether there will be a replacement or update of the DfT (2016) Incentive Fund and what it will look like. Therefore, the analysis in this chapter is timely, and future iterations or a replacement of the DfT incentive scheme should be more about outcomes, rather than focus on process. There also needs to be consideration of how to make any incentive schemes equitable.

More broadly, the findings of the DfT (2016) Incentive Fund analysis relate to three main aspects. Firstly, the need for a level playing field and how that lends itself to consideration of being able to attain this across all incentive schemes. Secondly, the important role of outcomes in incentive schemes, given their absence in the DfT Incentive Fund. Lastly, the interaction between devolution (present in other countries) and national governance. That is, an automatic maximum funding for devolved governance rendered the incentives obsolete and so treating devolved and non-devolved governance the same in relation to incentives is not the way forward.

5 The perception of satisfaction

5.1 Introduction

As defined earlier in Section 2.2, satisfaction is the gap between a person's expectations and the reality (Ipsos MORI then MORI, 2002; Stradling et al., 2017). Yet, this reality may actually be perceived reality, hence, this chapter considers the perception of satisfaction. The earlier Section 2.2, Figure 6 highlighted a presence of a key intermediary component (beliefs) between physical (tangible) characteristics and satisfaction (Guise et al., 2001). An intermediary component of beliefs conveys how perception can influence satisfaction, and so perception is worth exploring in relation to assessing satisfaction with highways.

Satisfaction is an important measure for various reasons. Firstly, satisfaction tells us what the public think (Pinkney and Marsden, 2013), unlike efficiency and quality alone. Secondly, satisfaction is susceptible to change among individuals (Poister and Thomas, 2011) and even for the same individual (Giese et al, 2001). That is, even if quality and efficiency remain unchanged, satisfaction changes. Lastly, satisfaction is useful as it negates the need to second guess what the public want (Pinkney and Marsden, 2013). All this means that satisfaction, and the related concept of perception, are both important.

In the particular case of local roads, there exist funding constraints that limit what LHAs can do (Institute for Government, 2022). There is then a need to prioritise spending on roads to maximise impact. A key part of this is an understanding of the public priorities to determine where spending will have the most benefit from the perceived perspective.

This research chapter looks at the local highway authorities, referred to as LHAs in this chapter. Recall from the introduction chapter, LHAs are the tier below central government

(DfT) and oversee over most of the local road network in England. The road network has certain challenges, which are not unique to the local roads in England but also apply to motorways in the UK and international roads. These challenges include funding shortfall, deciding where to invest and determining what is (most) important, often from the public perspective (Suanmali et al., 2013; Cunningham et al., 2015; Hamersma et al., 2016). The view is maintenance and investment decisions can be sound if they are informed by accounting for public views; this is done through conducting public satisfaction surveys.

This chapter develops an empirical model for satisfaction with highways to understand the role of public perception (see, for example, Giese et al., 2001). The motivation for this research is accountability: what metrics should LHAs be held accountable to and how does it inform policy? Whilst LHAs have a highways asset management policy, the public perceive what is delivered as opposed to what LHAs have delivered on, in reality. That is, subjective public satisfaction differs from a highways asset management policy.

The challenge is then not just wise allocation of a limited budget (Suanmali et al., 2015) to meet policy goals but fulfilling public desires such that improvements are noticed by the public. In other words, deliver what the public want but within broader policy and long-term aspects, such as, sustainability. Here, sustainability refers to both environmental sustainability (encourage active travel) and financial sustainability (manage assets effectively long term). The environmental sustainability is perhaps more easily perceived by the public. Given increasing austerity, accounting for public satisfaction is key due to a heightened importance placed on the best use of funds. That is, satisfaction might captures an unmeasurable aspect(s) that asset management alone would fail to convey.

It could be argued that if the public respond to asset condition, then the LHA should be able to deliver optimal choices of highway interventions if it is simply incentivised to deliver an optimised asset condition strategy. Yet, an emphasis on asset condition alone overlooks how public satisfaction goes beyond just considering the condition of assets (Pinkney and Marsden, 2013). Although asset conditions are objectively measured, there are a couple of key reasons to incentivise satisfaction. Firstly, public satisfaction is an overall measure of service quality, which can be important to incentivise LAs to deliver on, so as to make effective use of a limited budget. For example, service quality aspects relate to assets, such as, speed of repair and ease of reporting issues, that are proxied by satisfaction, but not asset condition. Secondly, a concern that satisfaction is a random variable, hence, asset condition is solely used. Our work explores if this is the case for a quality measure - road condition – and concludes that public satisfaction is not random.

The crucial aspect is whether the public perceive and react to improved road conditions by reporting higher satisfaction in the NHT Network (2018) survey. Thus, the research question is determining whether or not LHAs affect satisfaction. If the former (public perceive asset management), LHAs should be accountable for satisfaction metrics and asset management metrics. Also, it can reasonably be inferred that if the public respond to better asset management then they respond to improvements in other areas of service quality (such as, a prompt response to any reported potholes). We also consider explicitly in our modelling whether satisfaction is influenced by the change in local road condition as well as level measures. If road condition is found to be an important additional driver, then this could imply that the public react to what they see the LHA doing on the network.

To establish if this is the case, this chapter develops an empirical framework based on Roch and Poister (2006) to quantitatively model the drivers of public satisfaction. This

involves quantifying not just the influence of asset (road) conditions on satisfaction, but also the influence of exogenous factors. The exogenous factors are categorised as either demographic factors or community attachment factors. This characterisation is informed by the prior literature, as set out in section 5.2.2 later. In terms of community attachment, voter registration and home ownership both proxy for 'putting roots down' and follow the precedent of Roch and Poister (2006) that uses these. A measure of road/asset condition is standardised Road Condition (RDC), as defined earlier in Section 3.7.2. Although RDC is affected by bad weather, it is somewhat more within LA control, compared to other exogenous factors.

Following this introduction, the structure is as follows. Having defined satisfaction and its related concepts in Chapter 2, a more comprehensive satisfaction literature review forms Section 5.2, to help inform perception of highways and perceived quality. Section 5.3 builds on the background to the NHT data in Chapter 3 by detailing the use of NHT data to assess the perception of satisfaction. This is followed by the Methodology with Results and Discussion in Sections 5.4 and 5.5. respectively. Finally, Section 5.6 concludes.

5.2 Literature review

5.2.1 Broader measures related to satisfaction

There exists a comprehensive literature on satisfaction and happiness within travel, with some studies adopting a holistic approach. For example, research encompassing mood (Morris and Guerra, 2015), life satisfaction (Friman et al. 2017) and emotional well-being (Gärling et al., 2020) are all considered in relation to travel. Thus, there is a distinction made in the literature between an overall hedonic evaluation (such as, satisfaction and happiness) and an eudaimonic evaluation (for example, meaningfulness and well-being) (Zhu and Fan, 2018). The former is about pleasure and enjoyment whereas the latter is

about meaning and purpose. This distinction is important as people will always return to a state of hedonic happiness. For example, if you have a bad commute you experience dissatisfaction in the moment but will always return to your usual mood/satisfaction soon.

Yet, eudaimonic happiness is a higher level of happiness, relating to self-actualisation (Zhu and Fan, 2018). This pursuit of self-actualisation means that individuals thrive to flourish. This pursuit of the pinnacle of happiness has a positive impact on well-being, with travel satisfaction being a part of this.

Focusing on travel satisfaction, it is posited this consists of two components (De Vos, 2018a). An affective dimension incorporates emotions that arise during the trip, which includes freedom and control. The cognitive dimension includes an evaluation of the trip. The important aspect is how perceived value of trip affect trip evaluation, despite negative affective factors. Travel is not just a means to an end as “perceptions that the commute has value other than arriving at a destination significantly increases satisfaction for all modes” (St-Louis et al., 2014: 160).

When considering trip satisfaction and travel behaviour, there is the move towards bringing together theories from transport geography and social psychology to better understand travel decisions and perception (St-Louis et al., 2014). These theories give rise to external factors, such as, built environment, and internal factors, for example, socio-demographics, both additionally being included in studies. This conveys trip satisfaction is composed of internal and external characteristics

There also exists research on the negative part of satisfaction with user disgruntlement (Stradling et al., 2007) and mode dissonance (De Vos, 2018b) implied as being what 'satisfaction' measures in reality. Mode dissonance occurs when an individual prefers to use a certain mode of travel but is unable to due to constraints, such as, lack of travel options. This implies that satisfaction is not a stand-alone measure but one that can complement official statistics, such as, transport accessibility and/or local connectivity.

He et al. (2020) propose a conceptual framework where satisfaction feeds into psychological wellbeing and satisfaction is linked to social inclusion. Their view of social inclusion is centred on how well-functioning transport system can influence an elderly person's sense of community and satisfaction. Further, social inclusion then feeds into physical wellbeing. Our analysis uses individual characteristics for LHAs, namely demographics. Whereas He et al. (2020) also control for household characteristics and built environment. In their analysis of an ageing population, community means different things to different people.

This challenges the concept of community attachment as posed by Roch and Poister in Section 5.2.3 later. As our analysis is not focused on just an ageing population, we have to consider what community means for the wider population not just one demographic. Nevertheless, there is merit in the view that a well-functioning transit system can increase community participation (social inclusion) and increase satisfaction with local services.

5.2.2 Assessing satisfaction with local services

LHAs are increasingly being 'held to account' by satisfaction metrics. Examples include the Cost Quality Customer (CQC) efficiency framework (Wheat and Pinkney, 2013) and NHT Network (2018) satisfaction survey. In both cases, information is provided so that

LHAs can potentially be held to account (say, by elected members) for their performance, as partly measured by public satisfaction. The DfT (2016) Incentive Fund takes this one step further by linking funding to the score on a LHA self-assessed survey where 3 out of 22 questions relate to the 'customer', of which satisfaction is a part (see Appendix 4).

Poister and Thomas (2011) draw upon three criteria to assess motorists' satisfaction with state highways. These criteria are road conditions, smoothness and freely flowing traffic (congestion mitigated). A quality indicator is also included in the Poister and Thomas model that draws upon the familiar school grade system "(A=Excellent, B=Good, C=Fair, D=Poor and F=Failing)" (ibid: 608) to form a quality attribute.

However, their research looks at motorists i.e., car users not general public. In addition, while useful, the school grading system used by Poister and Thomas (2011) has negative connotations. This means that respondents may be reticent to grade highways as C to F (i.e., average to 'fail'). Thus, a grade system means even if someone is dissatisfied with highways they may not rate it as such. Another way to assess satisfaction is attributes.

TfL (2017) propose certain attributes are of most value to non-car users (pedestrians, cyclists, and public transport users). These are clean air, safety, not too much noise, and ease of crossing. This suggests these attributes should be used to assess satisfaction with highways, albeit for non-car users. As whilst safety impacts on the satisfaction of motorists too, satisfaction attributes for motorists differs. This implies mode of transport may impact satisfaction with highways via expectations. The TfL (2017) report suggests the use of travel attributes over personal attributes, such as, demographics. This implies both travel and personal factors are vital for understanding satisfaction via expectations.

Another facet of expectation is the role that information provision plays in expected resident satisfaction in relation to highways projects (Hamersma et al., 2016). Looking at Netherlands, the authors found that more information was not necessarily better, and the information source matters. Their paper refers to Not in My Backyard (NIMBY) views and cites several studies that highlight groups, namely, males and high income, that are more likely to possess NIMBY opposition. In addition, civic engagement is proposed as an alternative measurement to community attachment. In our analysis, demographics may perhaps be the economics of aspects of time and money, which impact on satisfaction.

To end this sub-section, it is useful to provide an overview of key satisfaction literature that was reviewed for this chapter. There exists similarities but also differences too. The main commonality is the recognition that more than one facet of satisfaction must exist.

Table 22: Overview of key satisfaction literature

Aspect	Drew et al. (2015)	Hietbrink et al. (2012)	Pinkney & Marsden (2013)	Poister & Thomas (2011)	Roch & Poister (2006)	Suanmali et al. (2015)
Service	Public services	Highways	Highways	Highways	Public services	Motorway
Method	Linear regression	Linear regression	Univariate analysis	Structural equation modelling	Linear regression	Linear regression
Location	Victoria	Netherlands	England	Georgia	Georgia	Thailand

Independent variable	Drew et al.	Hietbrink et al.	Pinkney & Marsden	Poister & Thomas	Roch & Poister	Suanmali et al.
Demographics	X				X	X
Income	X					X
Population	X					
Road length	X					
Unemployment	X					
Occupation						X
Expectations		X			X	
Information		X				
Performance		X	X		X	
Importance			X			
Road condition			X	X		
Flow				X		
Ride quality				X		
Congestion				X		
Safety				X		
Education					X	X
Perceived SQ					X	
Community attachment					X	X
Travel characteristics						X

Source: own overview of key prior satisfaction literature. SQ is Service Quality.

5.2.3 Overall satisfaction and its assessment

Following this literature on assessing satisfaction, there is then the question of an overall satisfaction vs satisfaction with certain aspects as two distinct potential measures. In the NRPS, the question on overall satisfaction with a journey provides a headline statistic. Transport Focus (2016: 6) posit that “overall satisfaction is ultimately what constitutes success or otherwise and is a highly relevant concept to survey participants.” The implication then is that although assessing satisfaction with individual aspects can be worthwhile, the real truth lies in a ‘taking everything into account’ satisfaction measure. This study follows a precedent for an overall satisfaction measure found in other studies.

To date, this chapter has discussed various characterisations of but also issues with satisfaction. We now consider an over-arching framework that helps explain satisfaction. Our work draws upon the Roch and Poister (2006) framework that expresses satisfaction with services as a function of various factors. The explicit statement is given as follows:

“Satisfaction with services =f(perceived quality of services, performance- expectations differential, demographic factors, attachment to the community and controls)” Roch and Poister (2006: 299) Eq. 6

The inclusion of perceived quality over objective quality recognises satisfaction is subjective (Roch and Poister, 2006). A performance-expectations differential is whether expectations exceed or fall short of performance. Citizen heterogeneity is accounted for with ethnicity, age, and other characteristics. Community attachment is formed of two variables: homeowner or not and registered voter or not. This conveys local investment, that is, stronger community attachment means higher expectations. A strength of the Roch and Poister equation is an explicit expression of attributes to measure satisfaction.

However, the Roch and Poister (2006) equation is not highways specific. Also, it is difficult to operationalise aspects of perceived quality and performance-expectations differential. Thus, Section 5.3.1 looks at how best to apply Roch and Poister's framework.

5.2.4 Summary

This literature review has further corroborated the presence of a strong link between service quality and satisfaction. Recall, from Section 2.2, two schools of thoughts posit whether satisfaction or service quality comes first when assessing satisfaction (MORI, 2002). The research undertaken in this chapter adopts the view of a satisfaction school of thought, that is, service quality precedes satisfaction.

This literature review adds to the generic literature review from Chapter 2 in a few ways. Firstly, it looked at alternatives measure to satisfaction, such as, happiness, for a holistic view. Secondly, it considers the specific application of satisfaction to the assessment of public services. Lastly, it highlights the independent variables considered in previous satisfaction analysis to better inform this research chapter.

The literature on well-being, mood, quality of life or life satisfaction are in relation to travel and not highways itself. Highways are an infrastructure as opposed to an activity as travel is. Whilst highways allow travel to destinations, certain aspects, such as, trust/confidence in LAs (Page et al., 2004) and not paying at the point of usage mean highways differ from travel. Although hedonistic measures, for example, well-being exist, it is felt that satisfaction is an appropriate measure for local highways, that is defined and assessed easily. This is because the local roads are the glue for all the forms of travel (House of Commons, 2019), that then impacts on mood, well-being, quality of life or life satisfaction.

Our research contributes to the satisfaction literature by undertaking a multi-dimensional econometric analysis of satisfaction for LHAs in England. The gap in the literature motivates a) considering the broad nature of highways not just motorists' or commuter satisfaction b) a robust measure of public satisfaction (in this case, unique satisfaction data from the NHT satisfaction survey) and c) the use of overall satisfaction, given the different facets of satisfaction. As such, this chapter builds on and extends the univariate analysis of the NHT satisfaction survey, as undertaken by Pinkney and Marsden (2013).

5.3 Satisfaction data and drivers of satisfaction

5.3.1 Applying satisfaction framework to LHAs

Before looking at satisfaction data and drivers of satisfaction, it is helpful to consider the framework used to assess highways satisfaction. The research study in this chapter uses a satisfaction framework for public services, as a starting point. The Figure below shows how the independent variables (drivers of satisfaction) were mapped from an explicit equation of satisfaction (Roch and Poister, 2006). As this research is on local highways, the variables selected are highways specific. In the case of performance-expectations differential variable, this can be a challenge to measure and so a proxy is used instead.

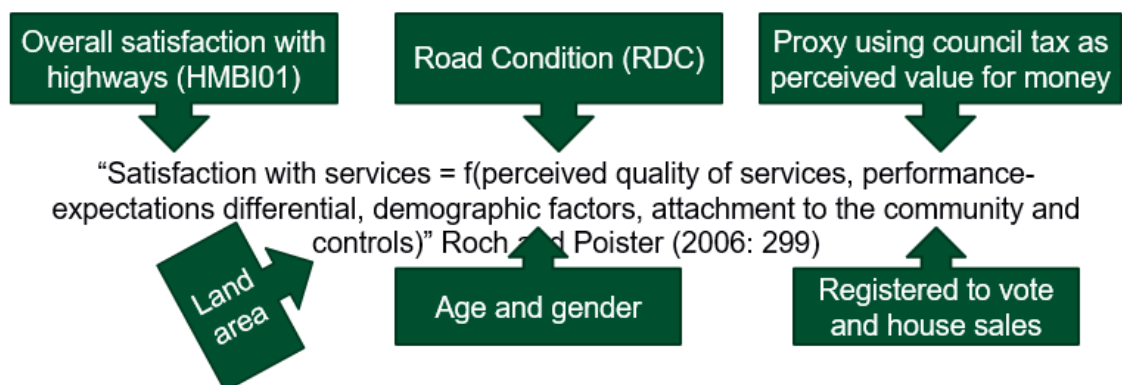


Figure 13: Making Roch and Poister highways specific

The Figure above is a good starting point for the independent variables included in the analysis in this chapter. Income is also included in the models executed in this study as a) it can proxy for mode of transport data (only available regionally) as mode influences expectations and b) some previous literature includes income as a driver of satisfaction. For instance, Drew et al. (2015) include income in their linear analysis of public services in Victoria, Australia and Suanmali et al. (2015) consider income for their linear analysis of motorways in Thailand. Note, land area was only included in preliminary analysis that executed RE vs FE with Hausman tests used to determine that FE is preferred over RE.

5.3.2 Use of NHT satisfaction data

Section 3.2 on the NHT Network (2018) survey provided background on the source of public satisfaction data for this perception analysis. In terms of response rates, the NHT satisfaction survey had around 800-1000 individuals from participating LAs each year, which was 91 LAs in 2017 as membership has grown. The data that was supplied to the researcher is 2010 to 2017 (though, the NHT satisfaction survey was inceptioned in 2008). Therefore, it is an extensive dataset on satisfaction, which is quality data, given that it is recognised in the DfT (2016) Incentive Fund as evidence of LAs considering satisfaction.

Recall, from Eq. 2 that NHT satisfaction data is based on a 5 point Likert scale ranging from VD to VS. The calculation occurs in two stages: Relative Satisfaction (RS) using own returns from the LHAs and a Highway Maintenance Benchmarking Indicator (HMBI) for comparison between LHAs. The formula for RS is $RS = \frac{n(VS) \cdot 4 + n(FS) \cdot 3 + n(neut) \cdot 2 + n(FD) \cdot 1}{n(VS) + n(FS) + n(neut) + n(FD) + n(VD)}$ where n is number of responses. This means that an individual who has not replied to this question is not included in the formula (although, overall NHT results are weighted). HMBI01 then follows from this RS

formula: $100 \cdot (\text{RS for the question}) / 4$. In this case, question number is 18.1 on satisfaction with road conditions (but survey changes over time means question number may differ).

The dependent variable (satisfaction) data is combined with data for the same time period (2010 – 2017) for our independent variables. Some data is only available at the regional level not at the LA level. Hence, we use other variables as proxies. This allows analysis of public satisfaction with highways for LAs in England. The descriptive statistics of the unique collated dataset are all summarised in Table 23 at the end of this section.

5.3.3 DfT data on road conditions

Road Conditions (RDC) data is from the DfT statistics (DfT, n.d). The DfT only publish data for RDC red (in need of maintenance) at an aggregate level over all roads in an LA or by road type. Outside of motorways, there are different classifications of roads related to both connectivity and their relative importance: A roads, B roads, C roads and Unclassified (U) roads (as is defined in Figure 1). There is a tendency for B and C roads to be merged when reporting data, as is the case with some literature that uses the data.

Section 3.7.2 provided the background to the typology of road condition (red, amber and green) and how it is measured through robust surveys. The rationale for using red road condition data is an expected strong association with highways satisfaction, as indicated through preliminary analysis. In other words, the technical way that road condition has been measured allows a 'beyond the surface' but the public only see the visible quality. This is important to note and was covered in Section 2.4.1 on service quality applications.

There is also change in RDC red from the previous year (DRDC red) included in analysis and also obtained from the DfT (n.d). This is to assess whether or not the public perceive improvements or deterioration not just the current conditions of the local roads. Our

preliminary model development looked at RDC red, amber and green at the aggregate level and by road type (see Appendix 5 for results of models). It was felt that RDC red at aggregate level is the most appropriate. In other words, the public are more likely to react to roads that are in urgent need of maintenance and perhaps regardless of the road type.

In terms of RDC red, a lower RDC indicates better asset/road management. This is key and will ensure the correct interpretation of results. RDC provides an objective measure of quality that is somewhat within LHA control who can improve roads but not influence road deterioration due to the weather. The RDC data is service quality, albeit an objective measure, rather than subjective perceived quality, as used for Roch and Poister (2006).

Whilst the RDC data is public, the individuals surveyed do not necessarily possess this information and this is a phenomenon attributed to bounded rationality (Arthur, 1994). Thus, it is important to note, our dependent variable is not satisfaction with RDC but rather satisfaction with (perceived) road conditions. That is, satisfaction is a gap between expectations and (perceived) reality, as was alluded to in the Introduction of this chapter.

5.3.4 Council tax as perceived quality

The Roch and Poister (2006) explicit statement for satisfaction with public services includes perceived quality of services. In mapping that onto our satisfaction equation, council tax was a good variable, as indicated by the public services literature looking at local government. For example, James (2007) surveyed individuals through the YouGov firm, with respondents asked about their expectations of excellent quality, given council tax and other resources for local services. It used a 5 point Likert scale for excellent quality: [expected] all of the time, most of the time, some of the time, rarely, never and do not know. The idea is rises in council tax levels raise expectation and this is where an

expectation-disconfirmation bias comes in. That is, the public expect roads to improve and perceive this to be the case if they pay more, even if road condition has not improved.

Council tax data exists in various forms from the Ministry of Housing, Communities & Local Government (MHCLG, 2018). These forms are: average council tax per dwelling; Band D including or excluding parish precepts; and % rise in Band D including or excluding parish precepts. The other bands of council tax are based on a proportion of the Band D council tax. Hence Band D is used for our analysis. As the amount of council tax per LA varies, we opt for % rise to allow for comparison. Note, all LAs were able to increase council tax to fund adult social care by an additional 2% and 3% in 2016-17 and 2017-18 respectively. The data excludes parish precepts, as this analysis is of LAs only.

In order to justify the inclusion of council tax, a good starting point is to look at what the council tax means for the public. This variable is the only one that is a tax, albeit a local tax paid by all adults, unless they are exempt (for example, students and armed forces). Council tax is not a fixed rate as the amount varies according to a) the value of the dwelling owned or rented and b) additional local charges, such as, police and fire service.

The council tax helps provide local/public services that cover refuse collection, libraries, schools and local roads (amongst other services). Initially, it was thought that council tax could proxy for value for money. However, council tax is not a toll charge so is not indicative of WTP, as is the case with road user surveys on toll roads (see Section 3.3).

While council tax may not be able to indicate WTP, it is still a useful measure for analysis. For this research, it is posited that council tax can be a possible indicator of (perceived)

value for money. This perception of value for money will influence satisfaction with local public services generally. In turn, but to a lesser extent, council tax can play a role in highways satisfaction. Given the breadth of services funded by council tax, it is anticipated the council tax coefficient may be small in size, compared to other variables.

5.3.5 Other drivers of satisfaction

The remaining independent variables proxy for expectations (demographics), mode of transport (income) and community attachment (housing and registered to vote) and are all from the ONS. Thus, it is worth providing a brief background to the ONS at this stage. While the DfT is a ministerial department, the ONS is a non-ministerial department.

The ONS is an executive office of the UK Statistics Authority. Although it works with the UK Statistics Authority, the ONS directly reports to UK Parliament. Recall, the UK Parliament forms legislation, for example, the Highways Act 1980. The UK government (no date,a) best explains the key role of ONS data within the UK:

“The Office for National Statistics is the UK’s largest independent producer of official statistics and the recognised national statistical institute of the UK. It is responsible for collecting and publishing statistics related to the economy, population and society at national, regional and local levels. It plays a leading role in national and international good practice in the production of official statistics.” UK government (no date,a: no page number)

The rationale for including demographics is the view that there may be age and/or gender differences in expectations, which in turn influences satisfaction. Generally, satisfaction surveys ask respondent profile questions. Yet, this may be for weighting purposes to ensure satisfaction represents general population. Looking at key satisfaction literature, there is a 50/50 split between those with demographics as independent variables (Drew et al., 2015; Roch and Poister, 2006; Suanmali et al., 2015) vs those without (Pinkney

and Marsden, 2013; Poister and Thomas, 2011; Hietbrink et al., 2012). Thus, this provides a good rationale to consider demographics in this study too. Age is categorical and gender is the proportion of male and female in the LA so 'male' is not a dummy variable in our analysis. All demographic data is from the ONS mid-year estimates.

There are different forms of income data. One measure is annual Gross Disposable Household Income (GDHI) to account for tax and benefits paid by or to individuals i.e., disposable income for saving or spending. GDHI data is available as raw numbers, GDHI per head, percentage growth in GDHI or growth in GDHI per head. As we are interested in disposable income, we opt for raw values; this is only available as rounded data. As income data is for the LA, it draws upon many people so rounded data should not affect accuracy too much. Whilst income is not given in real terms or inputted into models in real terms, we use it to proxy for mode of transport, as opposed to socio-economic status.

The motivation for income is to proxy for mode of transport data, which is only available at the regional level. An alternative measure we previously considered was licensed cars. Income, as an independent variable, is found in previous satisfaction literature to account for socio-economic status. The GDHI is a measure of not just wealth/prosperity but also deprivation. Whereas earnings data would be a wealth indicator for those in employment only and Index of Multiple Deprivation (IMD) would just indicate the extent of deprivation. Therefore, the rationale for income is to proxy for mode of transport and socio-economic status by making use of public data that is available annually at the local authority level.

In terms of the housing variable, this was a choice between housing ownership or house sales. The housing ownership variable was statistically insignificant in previous models

we ran. Thus, house ownership may not be the best measure of community attachment as home ownership can be by those residing in other LAs. While house sales for an LA can be affected by those outside the LA, house sales is a better community attachment variable, as corroborated by the staying power of satisfaction (Van Ryzin et al., 2004). That is, dissatisfaction means people move (and this can be out of the LA) and so dissatisfaction via house sales as a proxy can indicate a lack of community attachment. House sales is residential property sales by LA, defined as a % of dwelling stock for LA.

For voter registration statistics, this is based on the numbers that are registered to vote in local elections as of 1st December. The ONS figures include attainers (those who will be age 18 at the time of the election) as part of the total electors registered to vote, which is converted to a %. This assumes that those who will turn 18 before the election will actually register to vote so may not be 100% accurate. The registered voter statistics serve as a proxy for local community attachment. The rationale is that if individuals are not registered to vote in local elections, they are mobile and/or less attached to the local community and thus have lower expectations of LHAs.

The rationale for the land area variable is the previous literature that indicates the size of LHAs can matter for satisfaction. The size of LHAs can be measured in different ways. For example, Wheat (2017) use road length as an indicator of scale. Whereas Drew et al. (2015), in their analysis of Victoria, Australia used population as an indicator of size. The rationale for using land area, in this analysis, was two-fold: the hypothesis that land area is indicative of dispersed assets that can be harder to manage and the fact that land area is a time invariant variable. As land area is constant over time, land area varies across LHAs but over time so is a time invariant variable. Given land area is a time

invariant variable, it is only appropriate to include land area in RE models given FE models do not allow for the inclusion of time invariant variable.

The land area variable is from the ONS and excludes land waters. This exclusion means that land area is not then a true measure of the total surface area overseen by LAs. Nevertheless, land area from the ONS is a robust measure as it is a recognised national statistic. Land area is measured in hectares, where one hectare is 1000 square meters.

5.3.6 Overview of collated dataset

The data we use is available from 2010 so we cover 8 years from 2010-17. For house sales and income variable (GDHI), this was only available till 2016 so it is assumed 2016 data is the same as 2017. Our collated dataset forms a large dataset with quality robust data for 91 LHAs in England (as listed in Appendix 1). All of the descriptive statistics are summarised in the Table on the next page.

The maximum number of observations is $91 \times 8 = 728$ observations. Our dependent variable of NHT satisfaction has the least observations at 521, which limits the number of observations. The data is assumed to be random attrition. As DRDC red data are change from the previous year, there is no DRDC data for 2010. This means there is no 2010 data in our analysis as Stata omits LHAs for the years with missing data.

From the independent variables outlined in this section, a panel dataset is formed. The panel is unbalanced but on average each LA will have 3-4 years of data in the panel. It is worth noting, for the earlier years, LHAs possess little/no data as it does not exist or is missing by random. This means that the unbalanced nature of the panel data is random.

Table 23: Descriptive statistics for perception of satisfaction

Variable	Description	In Eq.	Units	Obs.	Source	Mean	SD	Min	Max
Dependent variable									
Public satisfaction	Satisfaction with the condition of roads	Sat.	0-100	521	NHT	35.304	7.883	12.622	56.948
Independent variables									
Road condition red (RDC)	Road in urgent need of maintenance	X ₁	KM	673	DfT	12.213	5.284	1.080	37.893
Change in RDC red (DRDC red)	Change in RDC red from the previous year	X ₂	KM	566	DfT	.007	2.894	-12.954	17.376
Age 16-34 years old (omitted category age 35-64)	Age 16-34 as % of age 16+	X ₃	%	728	ONS	29.411	4.783	20.482	49.570
Age 65+ years old	Age 65+ as % of age 16+	X ₄	%	728	ONS	22.201	3.523	11.617	34.069
Male (omitted category female)	Male as % of age 16+	X ₅	%	728	ONS	48.843	.602	47.412	50.911
Young male (male age 16-34)	Young male as % of age 16+	X ₆	%	728	ONS	14.399	2.488	9.905	24.914
Elderly male (male age 65+)	Elderly male as % of age 16+	X ₇		728	ONS	10.832	1.655	5.867	16.475
Council tax	% rise in Band D council tax	X ₈	%	728	MHCLG	1.645	1.796	-2.0004	5.290

House sales	House sales as % of stock	X ₉	%	600	ONS	3.747	.814	2.171	6.050
Income	Disposable income inc. benefits	X ₁₀	£	544	ONS	3946.53	1734.65	1245	13133
Vote	Registered to vote as % of the LHA population	X ₁₁	%	728	ONS	74.728	3.388	61.333	85.440
Tested (not in final model)									
Road condition red for A roads	A road in urgent need of repair		KM	721	DfT	4.087	2.123	.8	15
Road condition red for B/C roads	B/C road in urgent need of repair		KM	721	DfT	6.597	3.038	.961	16.771
Road condition red for U roads	Unclassified road in urgent need of repair		KM	678	DfT	15.187	7.545	1	45
Licensed cars	No. of licensed cars		No.	728	DfT	193.750	159.607	34.9	836.3
Housing owned	Owned occupied and rentals		%	600	ONS	81.263	5.897	66.880	93.098
Land area	Land area excluding waters		Hectare	728	ONS	115794	168845	3485.15	803771

Source: NHT (National Highways and Transport, 2017); DfT (Department for Transport, 2016); ONS (Office for National Statistics, various); MHCLG (Ministry of Housing, Communities & Local Government, 2018).

For this analysis, the use of Stata econometrics software meant a list wise deletion. This means any missing data (even if only one variable is missing) leads to an entire case (i.e., all data for an LA in that year) being omitted from analysis. Nevertheless, the models consist of 64 LAs and 283 observations; thus, there is a large sample for our satisfaction analysis (see Section 5.5 for Results and discussion). Before the Results, there is the Methodology section.

5.4 Methodology

5.4.1 Panel data regression method

Our panel data spans across 2010-2017 for 91 LAs. It is not a balanced panel as we do not have the same number of data points for LAs. Indeed, our sample increases over time, given membership rise for the NHT Network satisfaction survey over time. Our satisfaction model is:

$$\begin{aligned} \text{Satisfaction}_{it} = & \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} \quad \text{Eq. 7} \\ & + \beta_7 X_{7it} + \beta_8 X_{8it} + \beta_9 X_{9it} + \beta_{10} X_{10it} + \beta_{11} X_{11it} + \beta_{12} X_{12it} \\ & + \varepsilon_{it} \end{aligned}$$

This panel is two dimensional with an individual index (i) for each LA $i=1, \dots, 91$ and a time dimension (t) to identify the time period $t=1, \dots, 8$ for 2010-2017. The satisfaction and X_1 to X_{12} variables are defined in the table in the Data section. $\varepsilon_{it} = \alpha_i + \mu_{it}$, an error term consists of unobserved heterogeneity and idiosyncratic factors, respectively.

For a generic background to the panel regression method, please see Section 2.7.2 earlier on in this thesis. The suitability of parametric statistics when working with Likert scale has been covered in Section 2.7.3 already. Nevertheless, it is worth mentioning again that treating measures, comprising averages across respondents of Likert scale

data, as continuous data is accepted in the literature related to satisfaction if you possess data on many respondents. Thus, this is the stance adopted for this thesis/research too.

5.4.2 Variable choice and alternatives

Whilst the Data section focused on variable form (such as, % rise vs amount in £), it is worth mentioning there are variables executed in previous models, as in Table 23. These were alternative variables that we considered. A decision to omit was influenced by either finding statistically insignificant estimates on parameters when testing down, model fit and/or counter-intuitive signs on the parameter estimates (see, for example, Kennedy, 2002). Other model iterations also used a different satisfaction dependent variable and considered importance data. By going from general to specific and considering the model fit, the above parsimonious equation (Eq. 7) was yielded for final analysis. The following paragraphs outline the decision to go with a variable over another if the substitute exists.

RDC red by road type is a more granular form of the RDC red aggregate variable i.e., they can be viewed as nested measure of road condition (DfT, n.d.). In order to decide which to use (aggregate or by road type), the approach was to compare if RDC red by road type yielded a good model fit. The decision to opt for RDC red aggregate was due to three main reasons. Firstly, we found a negative relationship implying that improving A roads reduces satisfaction, despite A roads being the highest priority road type (House of Commons, 2019). Secondly, road conditions came across in the literature as important so overall road condition not road conditions by road type per se is what matters most (Ames, 2016). Thirdly, and evidenced by lack of model fit in Appendix 5, it is unlikely the public always know what road type they are travelling on. Hence, road type is perhaps just used by the LAs rather than by the public who may perceive roads as minor or major.

As mode of transport data is only available at the regional level, licensed cars at LA level was considered instead. It was anticipated the licensed cars could proxy for mode of transport and, in turn, expectations of, for example, car drivers (Poister and Thomas, 2011). The rationale for considering licensed cars was the availability of data at LA level with household % cars or cars per head available from other sources, such as, the NTS but with data not at an LA level and/or not produced annually (given census is decennial).

Yet, in terms of the final variable choice, demographics and income proxy for expectations and mode of transport, respectively. Both variables provided a better model fit compared to licensed cars. This is expected as a rise in licensed cars may be mostly due to greater car ownership across the same households. There may be a greater shift in expectations and income in moving from a non-car household to a one-car household, with income found in Table 22. This is something licensed cars is not able to explain as well, compared to the substitute (final) variables that explain their respective areas well.

In a similar vein, a rise in housing owned may somewhat reflect an increase in ownership by landlords and letting agents. Recall, the housing variable indicates community attachment (or lack of) (Roch and Poister, 2002). There is previous research on the staying power of satisfaction: people satisfied with highways are less likely to move out of LAs due to dissatisfaction with highways/management (Van Ryzin et al., 2004). This is something the housing owned variable does not really capture. As registered to vote also indicates community attachment via local involvement, it made sense to choose the best housing variable to go alongside registered to vote. In our case, it was house sales.

In terms of demographics, male was opted for over female as is the norm with choosing variables. The aim of the demographic interaction terms was to assess the impact of age

and gender on satisfaction with highways. The demographic ONS data is available as age categories spanning five years or for each age group separately. As we are looking at age 16+ so a wide age range, it made sense to opt for categories. Whereas if we were looking at, for example, college or university students it may make sense to consider each age group separately. The precedent in previous work is to consider young and elderly as two categories (Parkhurst et al., 2015). Whilst the consensus seems to be that elderly is age 65+, there is less consensus in the literature on the ages 'young' covers: age 16-25, age 18-25 or under 30/35. As the NHT Network surveys 16+, we use age 16 as the starting point and age 34 as the end point to cover all the possible ages for young.

5.5 Results and discussion

As mentioned already in this chapter, a panel dataset covering eight years (2010-17) for N=91 LAs was used to execute FE models. These FE results show the linear dependent variable model results, with the log-linear model results provided for comparison. The linear model is justified by a) previous satisfaction literature that uses linear regression, as per Table 22 and b) the sign is the same across all the coefficients in both models, as in the table below with preferred and comparator models, depending on functional form.

As mentioned previously, the models were executed with RDC red/amber aggregate or RDC red/amber by road type. This produced results with counter-intuitive signs (as seen in Appendix 5). For example, the finding that lower RDC red for A roads (better roads) is associated with a fall in satisfaction. As such, only the models with RDC red aggregate, are discussed in this chapter. The results table below compares linear vs log-linear FE models with Hausman test results for reference. The focus is the preferred linear model.

Table 24: NHT satisfaction model results

Variable	Model 1 FE with a linear dependent variable *Preferred model*	Model 2 FE with the log- linear dependent variable (Comparator model)
Constant	-2072.742	-55.89673
Road condition red (RDC)	-.199 (.064)	-.006 (.122)
Change in RDC red	.260 (.011)	.008 (.016)
% Age 16-34	40.785 (.075)	1.147 (.145)
% Age 65+	46.890 (.096)	1.419 (.143)
% Male	43.176 (.077)	1.208 (.150)
% Male age 16-34	-84.325 (.069)	-2.353 (.140)
% Male age 65+	-95.568 (.099)	-2.880 (.148)
Council tax % Band D rise	.286 (.147)	.009 (.189)
Income (GDHI)	.008 (.000)	.0002 (.000)
% House sales	-.316 (.701)	-.007 (.817)
Registered to vote	-.306 (.055)	-.008 (.173)
N (LHAs)	283 (64)	283 (64)

R ² within	0.4354	0.3583
Hausman test for FE vs RE	Prob>chi ² = .0002	Prob>chi ² = .0103

N.B. dependent variable is satisfaction or ln(satisfaction). P values given in parentheses.

Overall, the results indicate that our independent variables on their own either have a positive or negative impact on the NHT satisfaction dependent variable. However, the reality is one of intersectionality among certain variables, which is highlighted in Section 5.5.3 later. Prior to that, there is a discussion on the sign and magnitude of the parameter estimates on the variables explaining satisfaction.

5.5.1 Results: road conditions and satisfaction

The key aspect of our model is whether or not there is evidence that the public perceive better road conditions. The RDC red variable controls for the condition of the local road network, with a greater red value meaning a greater proportion of the road network is in need of maintenance. This means that a lower RDC is associated with better local roads.

We found that improving the local roads also increases satisfaction, which is statistically significant at 10% level in the linear model. In the preferred model (linear), a one unit rise in road condition means this deterioration in roads then reduces satisfaction by .199 in this instance. This means that the public perceive the improvements in road condition and report higher satisfaction in the NHT survey.

The negative sign on RDC red in the preferred linear model is expected, given that NHT survey results indicate that the road condition is the aspect most important to the public, but which they are least satisfied with (Ames, 2016). Our result (for both preferred and comparator FE models) is in line with the previous literature, for example, Poister and

Thomas (2011). Yet, in contrast to previous literature on roads, we consider the general public, and not just motorists. Hence, the impact of road condition is even more notable as it suggests this affects satisfaction for all road users and not just car users. This has implications for road user hierarchy and equity, but that is beyond the scope of this study.

Related to road condition, there is change in road condition (DRDC) from the previous year. DRDC indicates the extent of road maintenance undertaken so goes beyond just stating the road condition at the time it was measured. It could be you have two LAs with the same road condition, but one improved their roads more than the other. Thus, DRDC highlights the potential difference in investment in the road network or a lack of funding.

In addition, the two measures of RDC and DRDC assessed together will provide greater insight. That is, less(more) road works implies less(more) disruption to the road users, which can lead to higher(lower) satisfaction when road works occur. In order to improve road conditions (RDC), road maintenance takes place, which implies disruption to users.

A one unit fall in RDC red means the road condition this year is better compared to the previous year. This is seen in the results that indicate it is synonymous with an -.199 increase in satisfaction (negative relationship), which is also statistically significant at the 10% level. If RDC has fallen by one unit, then that must mean DRDC has also fallen by one unit. This is explained in the table below, by considering RDC and DRDC over time.

Table 25: Net impact of road conditions over time when improvement of one unit (-1) occurs in time period =1

Variable	Key coefficient (its own impact on satisfaction)	Time period=1 (satisfaction after change)	Time period=2 (satisfaction after a lag)	Explanation of the findings obtained here
Road condition red (RDC)	-.199 (.064)	(-0.199)*-1 (minus as falls)	(.0.199)*-1 (minus as falls)	Fall in RDC will persist
Change in RDC red	.260 (.011)	0.260*-1 (minus as falls)	0.260*-0 (DRDC same)	DRDC change in periods 0-1
Net impact on satisfaction	N/A consider in isolation	X = 49.939	X = 50.2	X=50.2
Implication		Satisfaction fall only short term	Satisfaction rise with a lag	Initial fall due to disruption

N.B. it is assumed a 1 percentage point decrease in RDC occurs, with satisfaction x=50

The positive relationship between DRDC and satisfaction arises from a lag between the disruption required to improve road condition that, in turn, will increase satisfaction. That is, the public want the roads to improve but are unhappy about the disruption this brings. Thus, the challenge for LAs lies in effective communications (and what that means) and co-ordinating with utility companies to improve local roads without negatively affecting satisfaction any more than is necessary.

5.5.2 Results: other drivers of satisfaction

The demographic variables range from 0 to 100. Across all models, age, and gender on their own positively impact on satisfaction. However, interaction terms (accounting for age and gender) negatively impact on satisfaction. Generally, males, young people and

elderly are more satisfied compared to the others. At an individual level/case, all of the demographic variables included are statistically significant at the 10% level. In line with some previous satisfaction literature, our research also found demographics to have an impact. This is in contrast to some literature where demographics had little/no impact on satisfaction. We postulate a few reasons why demographics does influence satisfaction.

Firstly, there is previous research (for example, Suanmali et al., 2015) that considers travel characteristics, such as, travel time and frequency so the focus is on a particular journey or route whereas this study looks at overall local highways not a usual journey. This relates back to Section 2.3 on normative expectations (Poister and Thomas, 2011), which is the view that those that travel on the same route frequently might have distorted (that is lower) expectations. Secondly, this research uses an objective measure of quality rather than perceived SQ obtained from participant ratings of the public service (see, Roch and Poister, 2006). In our research, expectations is then measured through objective demographics. Lastly, the dataset used in this analysis is aggregate with results from thousands of individuals for each LA and for 64 LAs in England; in smaller samples, it may be that demographics have minimal impact, which only arise in the larger samples.

A 1% rise in Band D council tax increases satisfaction by .29 in the linear FE model. In this preferred linear model, this result is statistically insignificant at any conventional level. In this model, the council tax variable acts as a proxy for perceived value for money. This, in turn, may influence expectations, albeit for public services generally not just local highways. As such, a small coefficient result is in line with our expectations given council tax is not solely spent on local highways. Also, LAs are limited as to how much they can increase council tax by, hence, there is likely to be less variation in satisfaction across LAs due to council tax. This means that satisfaction differences across LAs may be driven more by other factors, as included in the analysis.

A notable finding is the positive relationship that exists between satisfaction and council tax (albeit statistically insignificant). (The positive relationship between council tax and satisfaction is explained in Section 5.5.3). Yet, this is not to say that any council tax rise should be the maximum possible rise. It highlights the importance of funding highways (and public services generally) but does not necessarily mean this money should come from the public via council tax increases. As such, Appendix 2 covers the varied funding sources for local governance. Any rise in the council tax should be justified and highways funding should come from various funding pots, in order to facilitate long-term planning.

The income (GDHI) variable is also positive in both models. As council tax is based on value of dwelling, it is linked to income but not strongly correlated. A weak correlation coefficient of .0674 means it is appropriate to include both variables in our analysis. The income variable is statistically significant in the preferred FE linear model. As GDHI increases by £1 for the LA population, satisfaction increases by .008, or .03 at the sample mean suggesting that GDHI has to increase by a bit more than one unit in order to yield a one unit rise in satisfaction. Income has the lowest estimator of all the coefficients suggesting other factors are perhaps more important for satisfaction.

Nevertheless, this conveys that higher income implies higher satisfaction. There are a couple of reasons of this. Firstly, the literature on residential satisfaction implies it can be a challenge to achieve the right balance between connectivity that comes with A/B roads and noise from these road types (Hamersma et al., 2014). It could be that those with higher incomes have more choice where to live and can obtain the right balance (for them) between the aforementioned connectivity and noise. The other reasoning relates to time as those on lower incomes may also be 'time poor' so may not have the time to complain or have their say but those on higher income can perhaps push for the change

they want to see. This finding could also be 'measuring' the mode of transport and how that influences satisfaction, which would have been worth exploring if data was available.

In the linear FE model, a one unit rise in house sales reduces satisfaction by -.32 though this result is statistically insignificant. This conveys that new residents may have initial high expectations; hence, satisfaction falls as house sales rise. Note, it is acknowledged people move for many reasons. In contrast to previous literature, we find no evidence of the staying power of satisfaction (that is, dissatisfied people are more likely to move on increasing the overall satisfaction for that LA).

Finally, in addition to house sales, the registered to vote variable indicates the extent of local community attachment. This is negative and statistically significant at the 10% level in the FE linear model. The implication is those registered to vote have higher expectations, due to being more attached to community. A one unit increase in % registered to vote reduces satisfaction by -.31 in the preferred FE linear model.

The R^2 statistic is in line with previous research in the area of satisfaction. For example, in an analysis of drivers of satisfaction with local government, Page et al. (2004) found that 44% of satisfaction was explained by their model. The reason being that satisfaction is hard to pinpoint and even if satisfaction was analysed qualitatively via an open-ended question, it is likely that individuals would probably only be able to explain some of it. Furthermore, it is likely that the determinants of satisfaction are likely to overlap and/or feed into other drivers of satisfaction. For example, perceived value of money can be linked to the perceived quality of local roads, that combined can influence confidence in local government. Confidence is related to trust, which is another facet of satisfaction.

Whilst satisfaction is commonly defined as the gap between expectations and (service) quality, the data suggests that understanding satisfaction is about more than just these two components. It is acknowledged the independent variables are likely to interact in ways beyond the demographic interaction terms, as in the above models. For example, council tax rises might be less likely to affect young people some of whom may be students and/or still living at home. However, not paying council tax may mean there are differences in expectations, which we capture through an age 16-34 years variable. The dynamic nature of satisfaction is explored in the next sub-section on potential scenarios. It should be noted the model presented is 'best' as it is robust, uses high quality data not publicly available and presents an aggregate LA analysis not often seen with satisfaction.

5.5.3 A potential demographic scenario

Having considered the impact on NHT satisfaction of a one unit change for all of the independent variables, *ceteris paribus* for simplicity, a 'dynamic' scenarios is outlined. It is assumed that as in the real world and the way the model is set up, a one percentage point change in one variable will affect other variables too. The scenario covers council tax and is based on the FE linear model results. The table below summarises the scenario. Note, this scenario is hypothetical to help illustrate the 'real world' but the real impact may be more or less than the suggested numbers. There is a need to model this explicitly to help LAs make a case for funding, which forms a contribution of this chapter.

The average council tax percentage rise is 1.645% in the FE linear model. For the below scenario, this is rounded up to a 2% rise in council tax. Assuming income remains the same, disposable income would also fall as more money goes towards council tax after a rise. Although, by a lesser amount than a council tax rise as some adults are exempt from the council tax.

Table 26: Potential scenario and impact on satisfaction

Scenario	Variables affected	Amount	Direction	Impact on satisfaction
2% rise in council tax	Council tax	2% rise	Rise	0.572
	Disposable income	A 1 unit change (not all adults pay council tax)	Fall	-0.316
	Road conditions	A 1 unit change (only 1 unit as not all of council tax is spent on the roads)	Fall	0.199
	Change in RDC	A 1 unit change (assume change is equal to RDC)	Fall	-0.26
			Net	0.195

It is also possible to look at what can happen to local road conditions and change in road conditions. Recall, that a lower RDC is associated with a better road network. Hence, the table above outlines how a 1% point fall in road conditions, in turn, affects change in road conditions. Overall, the net impact of a 2% council tax rise is a positive impact of .195 on satisfaction, in this particular instance.

This scenario does not say that LAs should increase council tax. In fact, as can be seen from the descriptive statistics, on some occasions there is a fall in the council tax. This serves to highlight the view that the local roads need investment but that this should not necessarily come from increasing the council tax. For the most part, as alluded to earlier, a rise in council tax was often due to the need to accommodate social care, given an increasingly ageing population, rather than improving local roads.

Recall, in this thesis, council tax indicates a perceived value for money. Yet, it is perhaps not so much about the amount of council tax itself. But rather how informed (or otherwise) the public feel (or become following a council tax rise) about how their council tax is spent (Duffy and Chan, 2009). Outside of this scenario, all else equal, our analysis indicates that higher income is associated with a higher satisfaction with roads. But this seems to contradict the finding that a council tax rise, meaning a fall in income, also yields a higher satisfaction level. However, this finding of a fall in income (and deprivation) but also higher income being associated with higher satisfaction is corroborated by Ipsos MORI who used the Place Survey to create an Area Challenge Index (Duffy and Chan, 2009). This index identifies the extent that an LA is 'satisfaction resistant' i.e., factors, such as, deprivation that make it harder for an LA to improve their satisfaction. This highlights the complex nature of satisfaction, that is driven by various (and often contradictory) factors.

5.6 Conclusions

The question we set out to answer is whether or not the public perceive and respond to improved road conditions by reporting higher satisfaction. Our results indicate the public do notice changes in road conditions with a rise(fall) as roads improve(worsen). While we found small changes at aggregate level, it is likely to be higher at an individual level. In other words, it is easier to influence perception at an individual level over the LA level. This means it is acknowledged there are limits to speculation with use of aggregate data.

With perception of highways, this research suggests it is less about whether or not the public perceive and more to what extent they perceive improved road conditions and feel more satisfied. That is, a one unit change in road condition is perceived differently, given, for example, the impact of demographic characteristics and local community attachment.

Thus, LHAs influence satisfaction but with the caveat they only influence some aspects that impact on public perception. For example, encouraging voter registrations and (as budget pressures mean that LHAs have little choice) the rise in council tax. In addition, some areas have parish councils that may take some pressure off LHAs. Nevertheless, the public do perceive good asset management, albeit some will do so more than others.

In terms of contribution, our chapter adds to the literature on highways and, more broadly, the satisfaction literature with two main contributions. Firstly, our use of objective road condition from the DfT as opposed to solely relying on public views for the assessment of road condition. Secondly, this chapter is the first known chapter exploring perception of local highway assets and satisfaction for England at LHA level, drawing upon unique national benchmarking (NHT) data. Our research is broad and is not limited to certain groups (motorists, commuters or residents close to highway projects) or highway aspects (such as, motorways and pavements). The fact we consider aggregate satisfaction and not just individual/cohort satisfaction, is also a strength of this research.

It could be argued that using an objective road condition measure is potentially flawed as it assumes that individuals and LHAs perceive roads in the same way. That is, it is unlikely that the public perception of a pothole is the technical definition that LHAs use. However, this is what makes our findings strong; the fact that we are using a technocratic road condition and still find that the public perceive and react to it by reporting higher satisfaction. This means the research contributes to the debate on whether or not LHAs should be held accountable to satisfaction metrics alongside asset management metrics.

The issue with satisfaction is that it is more outside of LA control so satisfaction metrics should focus on facets of satisfaction, such as, communications. In fact, there is a move

towards encouraging LHAs to consider satisfaction, as per the NHT, CQC and DfT Incentive Fund, which all do not overlook the importance of good asset management. These aforementioned frameworks seem to be more about understanding satisfaction and the public role in this and not reaching satisfaction metrics, per se. Therefore, LHAs should focus on knowledge of satisfaction for their LHA, given they have that context to better understand the satisfaction data. In addition, LHA heterogeneity means being held accountable to public satisfaction alone would be as though we were comparing apples with oranges. Thus, LHAs should consider how these results can apply and potentially set their own satisfaction metrics alongside any existing LHA asset management metrics.

We now consider the opportunities for further research. The generalisability of these results, that is any LA can make use of implications, does not necessarily mean a direct translation to other countries. There are learnings, such as, the role of income, but a different governance structure may call for different independent variables. The lack of official statistics at LA level is mitigated by the use of proxies and justifying our choice of variables and FE model.

There is further research related to this specific work. As the satisfaction dependent variable has the least observations, there is the potential for interpolation though this is not without its issues. With interpolation of road condition, in Appendix 5, the results do not justify using interpolation.

We addressed the use of LHA data over respondent data. Yet, there is scope for an LHA to build on this model for their own benefit. For example, by including mode of transport, which is publicly available at regional level so can be used for combined authority

analysis. Overall, there is a case for more research on perception not just satisfaction and highways more broadly rather than the apparent emphasis on roads or motorways.

More generally, there is a need to better understand the role that perception plays within satisfaction of highways/public services to corroborate our findings. The consideration of satisfaction in funding highways is limited. Although the DfT (2016) Incentive Fund incorporates satisfaction, albeit not outcomes based. While the other highway funding sources in England, such as, the Potholes Fund and Needs Fund are based on objective measures; these are easier to calculate but does not mean funds go where most needed to benefit local road conditions and improve satisfaction with highways across England.

6 Parish council and satisfaction

6.1 Introduction

So far, this thesis has considered the central government's DfT (2016) Incentive Fund and the tier below of local authorities, referred to as principal authorities in this chapter. As such, attention is now given to the lowest governance tier in England: local councils. The National Association of Local Councils (NALC, n.d.) state the term local councils includes parish and town councils as well as community and neighbourhood councils. The relationship between the principal authority tier and the tier of local councils is of interest for this pilot study. Because "by working together, often with their principal (country, district, unitary and borough) authorities, they [local councils] can provide efficient services" (NALC, 2015:1).

Just over a third of people in England reside in a parished area, that is, they live somewhere with a local council (UK government, no date,b; NALC, n.d.). This third translates to 10,000 local councils and 100,000 councillors that play a role in local councils (NALC, n.d.) so a substantial number compared to principal authorities. For example, Leeds (the area of interest/study) is just one principal authority but has 32 local councils (Leeds City Council, 2021a).

Throughout this chapter, the term parish councils is used for both parish and town councils. Parish councils are the first tier of local governance (NALC, n.d., Leeds City Council, 2021a), which makes parish councils the tier of governance closest to the public (Leeds City Council, 2021a). This proximity of local governance to the public motivates this pilot research study on whether or not parish council communications can influence satisfaction with local highways. Section 6.2 and 6.3 provide further background on parish councils, their role, and the Leeds area that was focus of the pilot study conducted.

At a resident level, people in the community may come together to form, for example, a local group to give them a voice. The government made it easier for parish councils to be set up: a community group with a neighbourhood plan is sufficient to negate the need for a petition with a certain number of signatures (UK government, no date,b). Parish councils play a formal role as they enable communities to act, are a platform for a democratic voice and they possess statutory powers. With highways powers, there is the power for the parish councils to oversee and maintain footpaths and highways aspects; power to complain to the district council; and undertake traffic calming (Newman, 2005).

This research chapter on parish councils considers three main areas: local participation, local highways and citizen or resident satisfaction. There is an increasing trend towards considering satisfaction with highways. Examples of this shift include at the national level through the DfT (2016) Incentive Fund and at the principal authority level via the NHT Network satisfaction survey (NHT Network, 2018) and the CQC efficiency framework (Wheat and Pinkney, 2013). In relation to all three aforementioned areas mentioned at the start of this paragraph, this tends to be for highway projects. That is, how the extent of local involvement/participation affects satisfaction with highways projects. For example, NIMBY occurs at grassroots levels, as mentioned in Hamersma et al. (2018).

The study of parish councils aims to address the research gap of whether or not parish council communications can influence satisfaction with highways, over and above the influence of the principal authority. Also, looking at highways as a whole and how local involvement manifests, so not just consider highway projects as other studies do. The research will explore how parish council communications can play a role in influencing satisfaction with local highways, which involves considering the extent to which the public

become involved in local highways. This translates to two research objectives: a) to undertake semi-structured interviews of Leeds parish councils to assess their role in relation to highways and b) to assess if parish council communications can affect satisfaction with highways at a grassroots level.

Following this introduction, the remainder of this research chapter will be structured as follows. Sections 6.2 and 6.3 covers the background for Leeds and parish councils, respectively. This is followed by the Literature Review on citizen participation (Section 6.4) and Methodology (Section 6.5). The Results and Discussion form Section 6.6 of this chapter, Finally, Section 6.7 concludes and outlines further research to build on the pilot.

6.2 Background to Leeds, UK (area of study)

6.2.1 The history of Leeds

In its first known form, Leeds started as a Saxon village (Lambert, 2020). The Domesday Book of 1086 recorded the population of Leeds as around 200. This is small by today's standards, but at the time, Leeds was considered a large village, especially when compared to the many other areas. It was through trade and commerce that Leeds began to thrive. In Medieval times, there was the wool industry, weekly market, and biannual fairs, with the latter attracting people from all over Yorkshire. Nevertheless, it was farming that allowed most people to earn a living in Leeds. Despite having a population of around 1000, Leeds was neither viewed as large nor significant in the Middle Ages.

The 16th century was significant for growth in Leeds; this was due to a huge rise in cloth production and population (Lambert, 2020). It is estimated the Leeds population doubled from 3,000 in the late 16th century to 6,000 by mid-17th century. Leeds became a significant and large town - one of the largest in Yorkshire by the end of the 17th century.

In the 18th century, a diversity of industry existed in Leeds, such as, pottery, brick-making and numerous other trades (Lambert, 2020). However, the wool trade remained the most essential industry for Leeds. During that time, Leeds also became more connected. The Aire and Calder rivers allowed movement to Wakefield and work started on the well-known Leeds to Liverpool canal. As time went on, the population increased (30,000 at the first census in 1801), the wool industry lost its earlier prominence, and a number of shopping arcades were built in Leeds. Notably, in 1893, Leeds was recognised as a city.

In 1901, the population of Leeds surpassed 175,000 – a rapid rise that persisted through the 20th century (Lambert, 2020). There was also a growth in service industries. Leeds City Council established itself as one of the major employers in Leeds; the opening of museums in Leeds also saw tourism be another major local employer. The two main universities were founded in the 20th century. The presence of shopping centres increased, and the centre of Leeds was pedestrianised in the early 1970's. In 1974, 10 other boroughs and districts were incorporated into Leeds, thus, expanding its boundary. The year 2000 saw the Millennium Square come to exist in the city of Leeds. Leeds continues to grow and thrive in the 21st century, a far cry from its small village origin. Lastly, in 2020, the population of Leeds was 780,000.

Leeds City Council (2021b) provides context for Leeds in the present day. Leeds is the third largest city and continues to grow rapidly while also being one of the greenest cities in the UK. Their vision is “for Leeds to be a truly child friendly city” (ibid). Leeds is known for many things: culture, excellent transport links, universities, Leeds Teaching hospitals, award winning parks and shopping.

6.2.2 Governance of Leeds

Leeds belongs to the Yorkshire region and the country of England (Lambert, 2020) within the UK. At the national level, the NALC (2015) champions local councils, in terms of their work for the local communities. Yet, regionally, the Yorkshire Local Councils Association oversees only the local councils within the Yorkshire region (Leeds City Council, 2021a). Interestingly, at the time of writing, Garforth remains the only area within outer North and East Leeds without a local council and, as such, the Garforth Neighbourhood Plan Forum (GNFP, 2021) are looking at the pros and cons of establishing a Garforth parish council.

Yet, prior to the Local Government Act 1972, Garforth did have a parish council (GNFP, 2021). The Local Government Act 1972 merged the County borough of Leeds with the local boroughs, urban districts, and rural districts, such as, Morley, Garforth, and Wetherby. This meant that Leeds became one of the five metropolitan districts in West Yorkshire. Also, the borough and city status allowed Leeds to become the City of Leeds.

From 1974 to 1986, it was the West Yorkshire County Council that provided many of the key services locally (National Archives, n.d.). The Local Government Act 1985 abolished metropolitan county councils. As a result, Leeds City Council took on most of the Leeds functions with policing, fire services and public transport being provided as joint services.

6.3 Parish councils: background and their role

6.3.1 Background to parish councils

As mentioned in the introduction, parish council are the lowest level of governance in England. For this reason, a civil parish (usually just referred to as parish council) is commonly described as the grass-roots level of governance (Godfrey, 2007; Newman, 2005; Bevan, 2003; Pearce and Ellwood, 2002). Notably, parish councils are 'DIY [Do It

Yourself] democracy' and 'community self-help' (Bevan, 2003). Parish councils mostly oversee small rural communities (Pearce and Ellwood, 2002) and small urban areas, but have established in large urban areas too (Bennett, 2006).

Like principal authorities, the population covered by parish councils varies widely from hamlets covering less than 100 people to towns, for example, Hereford, with tens of thousands of people (Bennett, 2006). Unlike principal authorities, parish councils do not cover the whole country. Nevertheless, as mentioned in the introduction, they have a large presence across England.

Up until 2007, there were no parish councils in London as legislation prevented it (Sandford, 2019). The Local Government and Public Involvement in Health Act 2007 reinstated the power of Greater London to establish parish councils. Despite this, since the 2007 Act, only one new parish council was formed in London (for Queen's Park area).

6.3.2 The role of parish councils

In theory, parish (and town) councils (i.e., local councils) have the same powers as district councils (Sandford, 2019). However, in reality, local councils fail to have the sufficient capacity to deliver public services so focus on local environmental, community and amenity issues. As such, their typical role involves maintaining local facilities, such as: allotments, village halls or parks (Bennett, 2006). This includes litter collection and Britain in Bloom entries. The newest powers cover traffic calming, community transport and crime prevention. For example, a parish council can use precept to fund a Police Community Support Officer (PCSO) (Godfrey, 2007).

Some parish councils are more involved than others (Bennett, 2006). Depending on their size, they may not cover all of these aforementioned aspects. Some roles would then be fulfilled by the principal authorities instead. Though there is evidence of joint working between parish councils and principal authorities, for example, Burgess Hill Town Council providing a single help-point service for Hampshire residents (Bevan, 2003). Yet, parish councils have exclusive power to acquire and provide land for allotments if demand is not fulfilled (Sandford, 2019).

Parish councillors are elected for a four-year period to run the parish and meet at least once a year (Bennett, 2006). "Parish councils are the eyes and ears of a community" (Godfrey, 2007: 296). By undertaking surveys to feed into community planning, parish councils can then engage local communities and reflect their needs to benefit local residents. This information can be used to feed into strategic partnerships and into planning at the district level through the Local Development Framework.

6.3.3 Parish council challenges

There is an issue of duplication in terms of roles and financial arrangements. The former arises from potential overlap and confusion about the role of local council vs principal authority (Newman, 2005). The latter relates to 'double taxation'. That is, "when a local council provides a service, but the principal authority still charges taxpayers within the parish for the equivalent services provided elsewhere" (Bevan, 2003: 10). The then Department of Transport, Local Government and the Regions (now Department for Communities and Local Government) provided clear guidance; the resolving of these complex financial arrangements requires effective joint working or partnerships between local councils and principal authorities.

Although parish councils have an extensive range of powers, these translate to activities rather than delivery of services (Bevan, 2003). The Local Government Act 1972 was a crucial power granted to parish councils to allow income generation via a precept (a charge on council tax). Nevertheless, local councils are limited financially as they can only spend up to £5 per elector. Another issue is that reduction of the council tax base means less revenue for parish councils if precept remains unchanged (Sandford, 2019). As such, most local councils have to adjust aspirations accordingly and cannot effectively meet local needs (Pearce and Ellwood, 2002).

The final issue considered is that of lack of dissemination (Pearce and Ellwood, 2002). Local councils are obliged to ensure their communities are aware of current issues and planning applications. However, only two thirds of local councils post the agendas and planning applications to obtain comments. This is before even considering another issue of whether or not information reaches the public. That is, if they have to be proactive and look on the website vs receive information by opting into a mailing list. These informal methods for communicating with residents can mean low attendance at parish meetings. All of the aforementioned challenges are not unique, and so the next sub-section looks at parish council features and international citizen voice to better understand the specific issues related to grassroots governance.

6.3.4 Parishes vs international citizen voice

As alluded to in Section 1.2, there are a number of features that make parish councils in England unique to other forms of grassroots governance. Firstly, parish councils are not universal across England, and it was not until 2007 they were allowed to form in London (Sandford, 2019). Secondly, parish councils are a statutory body with elected members, and they are an official tier of governance with powers (Newman, 2005). Thirdly, the

parish council Charter (see, for example, Leeds City Council, 2021a) sets out how principal authorities must work with parish councils and vice-versa, meaning that both play a role in working together. Lastly, parish councils are allowed to raise an unlimited amount of revenue. This latter point has led to the formation of ‘super’ parish councils that have taken on some roles from cash-strapped principal authorities (Merrick, 2019). The remainder of this sub-section outlines the form of grassroots governance in other countries as context for England. (The concept of citizen participation itself will be defined in Section 6.4 next).

While citizen participation broadly exists internationally, the level of engagement and the opportunity to be heard varies globally across countries (Scottish Government, 2021). The proactiveness of citizens also differs. These two aspects may be inter-related: strong forms of citizen participation channels are linked to increased levels of citizen initiation. This links to parish councils, which requires active citizens to implement and yield impact.

There are similarities and contrasts when considering citizen participation internationally (Scottish Government, 2021). For example, the widespread use of local referenda that comes from citizens in Germany contrasts with its non-use in Denmark where the citizen initiation is missing. In terms of similarities, there is local community voice with growth in co-governance of natural resources by Maori communities in New Zealand and the self-government rights for the Inuit communities in Quebec. There is an international need to develop citizen participation given, for example, the ongoing decentralisation in Uruguay.

The broader picture for councils internationally (whether neighbourhood or community councils) is that there are some shared issues (Scottish Government, 2021). They “are not as representative of local populations as they could be, have limited responsibilities

and lack any real influence on local governance” (ibid: 14). Although, in the past two decades, there has been a marked effort to bring about more citizen participation through participatory budgeting and citizen initiated binding referenda. The issue is non-binding referenda, which is often the norm in most countries. As without a legal impetus, local governance and citizen views can often end up being discretionary i.e., it will be ignored.

Therefore, the table below summarises the global opportunities for and barriers to citizen involvement. Each ‘opportunity’ has been lined up with an associated ‘block’ to citizen involvement. This is not to say blocks are intentional, but it helps to paint the big picture.

Table 27: Opportunities and barriers for citizen participation

For the most part, across countries, citizen participation is an active issue	
Opportunities for citizen involvement	Barriers to citizen local involvement
<ul style="list-style-type: none"> • The broad picture is one of varied opportunities • Ability exists to allow for local citizen participation and then to act on this to yield impact on local decision-making • The existence of the non-discretionary participation with binding results are perhaps much more influential when it comes to increasing engagement 	<ul style="list-style-type: none"> • However, initiatives can be one-off or too niche • But the little impact on local decision-making means community disengage, given lack of empowerment • Although citizen initiated participation help to yield increased engagement, opportunities are much rarer with this form of citizen involvement

Source: own summary of Scottish Government (2021: 16) and their international review.

Having provided a background to the area of study (Leeds) and to citizen participation internationally, there is now attention given to the literature review on citizen participation.

This begins by defining citizen participation, which was intentionally not defined earlier on, so the literature can inform the definition that then informs the parish council pilot. The focus of the literature that follows is on the various key models of citizen participation.

6.4 Literature review on citizen participation

The concept of user/citizen participation is pertinent to this research chapter. In response to 'what is citizen participation?', Arnstein (1969: 216) states it "is simply that citizen participation is a categorical term for citizen power". It should be noted Arnstein is an American author, but her work has been applied internationally. This means that while the levels of engagement that people want and expect may differ across countries, there is a case for looking at this seminal piece of work and learnings for parish participation.

There are three power or participation aspects that are of relevance for this pilot study of Leeds parish councils. Firstly, the power that parish councils have for the public that they represent possess within local governance (Newman, 2005). Secondly, the appropriate level of power for grass roots governance – it is not expected that this will be full citizen control, as per Arnstein (1969) on local citizen participation more broadly. Lastly, the discrepancy or gap between the power possessed and the perceived or expected power.

In a similar vein to challenges faced by principal authorities, parish councils also face budget constraints. With budget cuts at principal authority level, there may be a transfer of assets to a parish council, but not necessarily a higher degree of power. This raises the question about how power and responsibility interact with each other. Parish councils have a responsibility to the public they represent whilst principal authority is responsible for acting in the best interests of an authority as a whole not just one parish council.

Furthermore, parish councils have the power to be heard but whether they are listened to or feel listened to is what this pilot study of the Leeds parish councils aims to uncover.

6.4.1 Importance of citizen participation

Arnstein (1969) posits that certain terms, namely, self-help or citizen involvement can detract from the real question of what citizen participation is and its role in society. Citizen participation is important for democracy (Arnstein, 1969), accountability (Tritter and McCallum, 2006) and empowerment (Burns et al., 1994). The Arnstein (1969) typology is considered to be a seminal model for policy makers and practitioners that want to proactively facilitate citizen involvement.

The Arnstein (1969) framework emphasises power. The view is that the governed or have-not citizens benefit from a power redistribution where the status quo is challenged. This power should be 'real' power, not a token gesture. Otherwise, the government or powerholders can say they considered citizens by going through the motions of participation that do not empower citizens. To illustrate this, Arnstein (1969: 216) points to a French poster that, when translated to English, spells out in turn 'I/You/We Participate' but ends with 'They Profit'. Hence, citizen participation can be a meaningless, frustrating, and often empty process (for citizens that is).

Although Arnstein (1969) draws upon urban renewal, anti-poverty, and model cities (i.e., social programs), the citizen participation typology proposed applies to other areas in her view. The distinction between participation and 'non-participation' is highlighted by rungs of a ladder with non-participation as the bottom two rungs of *Manipulation* followed by *Therapy*. The objective of these lower rungs is not genuine participation, Arnstein posits,

but to serve the purpose of looking like 'participation', masked as 'education' or 'curing' of participants by those in power.

The following rungs three to five are *Informing*, *Consultation* and *Placation* respectively; they are said to be different levels of tokenism (Arnstein, 1969). On the one hand, they provide the governed with a voice; on the other hand, the public lack real power to ensure their views attain reality as they cannot push these views through. The result: status quo is unchanged. Placation, in particular, is one based on advising so citizens are 'heard' but not necessarily listened to as those in power ultimately make the final decisions so continue to hold the power.

The top-most rungs of the ladder relate to levels of ability to increasingly influence the decision makers (Arnstein, 1969). The final rungs covering six to eight on the ladder are *Partnership*, *Power* and *Citizen Control*. Note that, citizen control can take the form of full power or indicates having a majority in decision making. Arnstein (1969) acknowledges that an eight rung ladder makes citizen participation appear to be well-defined and simple when in reality it is complex.

Nevertheless, Arnstein's (1969) ladder highlights the increasing degrees of citizen power or participation. According to Bailey and Grossardt (2006), in their application to transport in Kentucky, the public want partnership and are instead given consultation, which gives rise to an Arnstein Gap. That is, the Arnstein Gap is the discrepancy between the actual levels of involvement vs the desired levels of involvement.

There exists other models of citizen participation that are also based on the rungs of a ladder. Wilcox (1994) proposes a collaborative participatory model that contrasts with the oppositional one by Arnstein (1969). The former model has five rungs on the ladder climbing through stages of information, consultation, deciding together, acting together, and then supporting individual initiatives (Wilcox, 1994). The fact that there are fewer rungs is due to Wilcox proposing that participation begins at information, which omits the token gestures of Arnstein's (1969) model.

Arnstein (1969) seems to suggest that progression up the ladder is a good thing for citizens' power. However, the general public do not necessarily want to be towards the top of the ladder. Hence, the Connor (1988) citizen participation ladder posits lower rungs of education, information/feedback, and consultation for the public while higher rungs of joint planning, mediation, litigation, and revolution/prevention are for the leaders. Although the Connor (1988) model is for the education sector, there are parallels for satisfaction with highways in terms of improving knowledge of what is feasible given limited resources i.e., manage expectations of the public.

6.4.2 Beyond Arnstein and the hierarchy

The Arnstein (1969) framework is not without its limitations. Firstly, it juxtaposes the powerless as 'nobodies' and the powerful as 'somebodies' to emphasise their differences: it implies they are two homogeneous groups. Yet, as Arnstein points out it is easy to perceive one as being the people and the other as being the system, which ignores the diversity present within the respective groups. Secondly, Arnstein's work highlights the need for genuine participation but without exploring the barriers that prevent this happening for citizens. Finally, the eight rungs are presented as a hierarchical ladder but in reality there are many rungs, which may overlap.

The Arnstein (1969) framework has been adapted and applied to other areas beyond planning. These alternative citizen participation models (summarised previously in the last two paragraphs of Section 6.4.1) have also been critiqued (Tritter and McCallum, 2006). One criticism is that they all take the hierarchical approach to involvement as a given. This reinforces the perception that some participation rungs are 'better' than others. Yet, who is to say that what is 'best' for one person is also 'better' for everyone?

In relation to this, another criticism is the acceptance of citizen control as being the peak that all users want to attain (Tritter and McCallum, 2006). As they point out, a concern with citizen control is 'tyranny of the majority'. This is where the needs of the majority are met but at the expense of others.

Despite criticisms, the Arnstein (1969) ladder remains the "touchstone for policy makers and practitioners promoting user involvement (Tritter and McCallum, 2006: 156). Whilst no doubt important in the area of citizen involvement, the issue is that Arnstein's (1969) model is taken as given (uncritically put to use). This is despite the fact that knowledge of citizen participation and engagement evolved over time (Tritter and McCallum, 2006).

Whilst Arnstein's (1969) model is illustrated as a ladder, the depiction seems to be of a power struggle. By focusing on power alone, Arnstein's typology limits the scope for effective user involvement and falls short of having a tailored process to account for varying knowledge and expertise (Tritter and McCallum, 2006). By exploring patient and public involvement, a more nuanced and dynamic framework is presented instead, next.

6.4.3 Dynamic user participation model

Tritter and McCallum (2006) propose a number of changes to the Arnstein (1969) ladder and later developments and refinements that arose from her work. These changes proposed are move from solely vertical to consider horizontal accountability, scope for continuous and one-off user involvement and recognise non-participation as being of value for some people (Tritter and McCallum, 2006). Even if user involvement had multiple ladders with varied numbers of rungs for the different categories of users, such a scaffold approach would still be overly reliant on hierarchy. Thus, a mosaic analogy is proposed to capture the complexity and dynamic nature of relationships. This reflects the individual and groups that contribute diverse levels of involvement and brings together different knowledge, such as, lay person and professional for the complementarity of perspectives.

A dynamic participation framework allows for involvement to change over time and recognises participation and non-participation as legitimate (Tritter and McCallum, 2006). The suggestion of dynamic participation is that users themselves can decide on their extent of involvement (if any). At different stages, users may switch between levels of participation, hence, going beyond rungs allows for a nuanced model of participation.

In the prior public perception chapter, the role of expectations was emphasised. Expectations also play a role in public involvement as participation is likely to fail “when there is a mismatch of expectations or [emphasis in original] method” (Tritter and McCallum, 2006: 157). If users expect consultation, for example, but the opportunity (method) is absent then the participation process fails to meet their expectations.

6.4.4 Summary of citizen participation

The citizen involvement literature highlights how communications and engagement go hand-in-hand: you cannot have one without the other. If parish councils communicate but the public do not engage then it can be a challenge to ensure they meet the needs of the local community and effectively liaise with LAs. Conversely, parish councils that attain engagement but without a communications strategy can mean having a 'nice chat' with the public (token gesture, as per Arnstein, 1969), but no clear purpose is achieved.

When applied to parish councils, the dynamic user participation means the public engage with parish council communications in different ways according to the nature of the communication (Tritter and McCallum, 2006). For example, the public read minutes of the parish council meetings but (truly) have their say through consultations. Whilst the public can follow up on aspects of the minutes, it would not be appropriate to engage in a lengthy discussion. It is through communicating that the public and parish council can better understand each other to bring about and develop appropriate strategies. Thus, the implication is that parish councils that are competent at communications increase satisfaction by raising trust and confidence in their ability to be a vocal voice of the public.

6.5 Methodology

The Methodology section outlines the execution of a semi-structured interview process. For a literature review on qualitative interviews, please refer to Section 2.8 earlier in this thesis. This section covers aspects of the data collection process for a Leeds pilot study: sampling, participant recruitment, interview design and methods to analyse results. The term parish councils is used throughout, although, a town council did participate as well.

The target sample is Leeds metropolitan district in West Yorkshire. Leeds was chosen for two reasons. Firstly, in terms of the population, Leeds is the second-largest principal authority with just under 800,000 inhabitants (Leeds City Council, n.d.). Secondly, it was anticipated Leeds parish councils may be more willing to participate in research by the local University of Leeds than Birmingham, which has the largest population in England.

A key and overall part of recruitment was communicating the importance devoted to the ethical aspects of the research throughout. This comprised of the following aspects: an approval (and updated approval) from University of Leeds for the research; confidentiality and data protection throughout from data collection to dissemination; and the need for informed consent and right to withdraw (at all stages). This was communicated to all the participants in an information sheet to obtain consent.

In relation to methodology, the need for confidentiality especially with remote interviews was given due thought. All of the data from the interviews are kept on a secure drive at the University of Leeds and only accessible to the researcher and the supervisors of this thesis. There is also an accompanying Data Management Plan to ensure confidentiality.

6.5.1 Recruitment of participants

In terms of recruitment, the pandemic meant that community centres and villages halls were closed. This ruled out the in-person approach, for example by approaching before the start of parish council meetings. It was felt a postal method is more suited for surveys than interviews. Also, the pandemic affected the delivery of post with delays in the mail reaching people and delays on the other end as parish councils may only be occasionally picking up their post with the closure of community centres during the pandemic. Under usual circumstances, parish councils would operate out of this and hold meetings there.

There were two waves of research conducted with one in summer 2020 and the other in early 2021. Parish councils do not meet over the summer, which helps explain the low response rate in June-August 2020. With the low response rate in summer, there was a second wave of research in January-February 2021.

Having already invited all Leeds parish councils in the first wave, the research did not exclude participants, though the first wave did rely on self-selection. The self-selection issue is not unique to interviews and is found with the NHT survey too. The information sheet meant that all participants received the same information, regardless of the wave of research.

The information sheet went into the specifics of this research and outlined the focus on local highways. Across both waves, all participants were informed this research is about parish council and effectiveness with respect to local highways. The word effectiveness was intentionally not explained to help to obtain a true picture. This is as opposed to parish councils trying to pre-empt the information we want. In other words, it was hoped the interviews would paint a picture of what effectiveness means for parish council / highways. All parish councils were encouraged to ask questions and/or seek clarification before signing the consent form and again before the interview.

6.5.2 Method of sample selection

In the first wave, stratified sampling was employed where all of the participants that meet the target characteristics are approached (Naderifar et al, 2017), in this case Leeds parish councils. Thus, an invite email and a reminder email was sent to all parish councils in the summer of 2020. The invite was addressed to the Parish Clerk whose details are

publicly available. However, it was not always the Parish Clerk that participated in the interview. As is mentioned earlier, the first wave successfully recruited two participants.

The sampling technique and recruitment method were modified for the second wave of interviews, in the hope of obtaining more participants. The snowball or chain-sampling method is often used to reach a hidden group, such as, illegal drug users (Naderifar et al., 2017). It can also be used to top up an existing sample till data saturation is achieved.

The snowball sampling method works in one of two ways (Etikan et al., 2015). The researcher recruit the participants for wave one who are then asked to approach their network for wave two (one way). The wave two participants then recruit for wave three and so on to the point of data saturation. Or there is the linear snowball sampling method where the researcher approaches a single or initial participant. The first participant suggest a second participant with the nominated second participant recruiting a third, again, until data saturation.

For the linear snowball sampling method, the secondary PhD supervisor approached a known acquaintance who became the first participant. This participation then suggested a second parish council who was interviewed. This was a parish council with a Leeds postcode but part of the Bradford district. For this research, the linear snowball sampling method yielded another two interviews with parish councils, so a total of four interviews.

Both participants from the snowball sampling method were sent an information sheet to consent to. However, they only received this after initial recruitment. It is likely that not being approached by the lead researcher meant they received different information at

the initial approach. This is because one was approached by the PhD supervisor, and another approached by a participant. This is more of a concern after the first participant as each subsequent participant is a step removed from the research team. Nevertheless, it was clear that both participants understood the pilot study was about transport/roads.

There are two main issues with the snowball sampling method (Etikan et al., 2015). The first issue is that relying on word-of-mouth to recruit can mean that respondents recruit participants with similar outlook or characteristics. For the most part, parish council members are white, male, and retired or semi-retired, so the population is homogenous that, to a certain extent, it mitigates the first issue. The second issue is exclusionary aspect of word-of-mouth as people have to be known to the participants to be recruited.

6.5.3 Interview design (semi-structured)

The interview questions drew upon the advice from the literature review: use of open-ended questions, no leading questions and go from general to specific. There was no pre-screening questionnaire as, judging by the response rate, it was assumed that parish councils would opt-out themselves in recruitment. The questions were reviewed between the two waves with some modifications made to maximise the rich data that we obtained.

Leading question, as the name suggests, attempts to lead the interviewees, consciously or unconsciously, into providing a certain response (Agee, 2009). That is, a leading question assumes a certain stance and means the researcher is not open to answers. For example, in this research, asking 'What funding challenges do you face as a parish council' almost leads parish councils to mention financial challenges. Instead, we ask 'What role do parish councils play?' that is more open-ended as opposed to leading an interviewee to mention what they think is relevant. This may or may not include financial

challenges. The important point is that an interviewee is not being led to a certain answer to 'fit' what an interviewer expects or wants to hear.

There was a brief script read out at the start of all the interviews. This was used to thank participants for agreeing to take part, reiterate research ethics and cover the expected duration of the interview. As such, all participants received the same information at the start, despite it being a semi-structured interview.

The nature of semi-structured interviews meant all participants were asked the same general questions at the start. But the response to these initial questions would then affect the wording and order of the rest of the questions. There were also a couple of instances where participants were screened out of later questions as they were deemed irrelevant, or questions were asked differently. The result is around 30 minute interviews for two parish councils and approximately 50 minute interviews for the other two parish councils. Whilst Appendix 6 lists the interview questions, the reality is that these acted more as prompts, so there was a need to be flexible.

6.5.4 Method used to analyse the results

All of the interviews with the parish councils were recorded. Depending on the consent obtained from participants, recordings were either audio only recording or both an audio and video. For the most part, it was the latter.

The interviews took place using Microsoft Teams. This meant that Microsoft Stream provided an automatic (but not accurate) transcript. The interviewer took notes and jotted down follow up questions as they came to mind, hence, semi-structured interviews. The rest of this sub-section focuses on the method.

The researcher is aware of NVIVO and thematic analysis as two possible ways to identify themes in interviews. Given the small sample size in our pilot study, the appropriateness of themes was questioned. Is something a theme if only found across a few interviews? This is not to undermine the quality research of Leeds parishes but recognise a limitation.

As such, the steps taken to analyse the interviews were as follows. Firstly, the interviews were transcribed. Secondly, all of the interviews were read in one sitting to see if any themes came to light, given the two waves of research. Lastly, the nature of our interview questions (see Appendix 6) lent themselves naturally to the sub-headings in the Results.

Whilst the results are presented as the role of parish councils, parish power and influence on local highways and communications, in reality, these aspects are linked. For example, the role of parish councils is expected to be linked to its power, according to literature review of parish councils and their role. A key theme that underpinned all the questions and answers was the relationship with principal authorities and need to manage this, which is explored in Section 6.7.1 later on.

6.6 Preliminary results and discussion

The results are presented thematically, rather than individually by parish council. In turn, this sub-section covers the role and size of parish councils (Section 6.6.1.), parish power and involvement (Section 6.6.2) and highways and communications (Section 6.6.3). The findings are summarised in Section 6.6.4.

6.6.1 Role and size of parish councils

The response to 'role of the parish council' corroborates the background/contextual literature on parish councils (as per Section 2). The findings indicate that the response

of interviewees broadly fall into two categories: parish council legal duties and responsibilities and how they are perceived by the public. In terms of the former category, the interviews acknowledge that parish councils look after and improve their area, and the form that this takes varies from one parish council to another. With the latter category of perception, a respondent said that parish councils are like a little principal authority: a miniature version of principal authorities with legal duties and accountability to residents. There is also perception of parish councils by principal authorities.

“And the people who work for Leeds tend to be pretty cooperative and they respect our role, I suppose, as a parish council” (Leeds parish council, pilot study 2020-21)

A key role implied in the literature and that comes through in interviews is how parish councils can influence the sustainability of highways. In fact, one parish council commissioned a report by transport consultants to endeavour for more pedestrianisation in their area of Leeds. Whilst principal authorities maintain local highways, parish councils can play a role in traffic issues locally and comment on the highways impact of major planning developments. Beyond highways, in terms of sustainability, parish councils manage green and open spaces, run allotments and even plant trees. One even mentioned a nature reserve, which shows the diversity of sustainability locally. This implies there is the scope for highways powers (as listed in Appendix 7) to include sustainability.

“The biggest impact on [area of Leeds redacted] is new houses and the reason is- one of the key reasons that that’s a big impact is the lack of sustainable travel” (Leeds parish council, pilot study 2020-21)

There has been research on the size of principal authorities and how it impacts on satisfaction and/or quality. That is, there is an optimal size that is efficient (see, for

example, Wheat, 2017). In this pilot study of Leeds parish councils, all had around ten members on the parish council. It was anticipated that this would give an indication of size and, thus, an ability to influence. In this case, it seems that capital resources are just as important (if not more important) than the number of parish members i.e., human resources. In other words, the ability to raise funds is crucial, given the issue of budget constraints parish councils face (as is highlighted in Section 6.3.3). The more funds a parish council raise, the more staff they can employ. For instance, one parish council in Leeds has a parish caretaker to keep the parish looking clean and presentable, which is normally part of the Leeds City Council responsibility. It should be noted that all parish councils have a parish clerk as a staff member whose role involves minute taking at meetings and being a point of contact on principal authority and parish council websites.

“So, it’s quite a large organisation with the- with half a dozen members of staff and [redacted six figure] budget.” (Leeds parish council, pilot study 2020-21)

There is also the question of whether the ‘size’ of parish councils means something different to the size of principal authorities. With the latter, this is either population (Drew et al., 2015), road length as per CQC (Wheat and Pinkney, 2013) or land area (considered in the previous research chapter). In terms of the parish councils, ‘size’ could be about the precept amount (recall, precept is an extra council tax charge (Bevan, 2003)).

Unlike principal authorities who are only able to raise council tax by up to 2%, parish councils have the power to set the precept as high as they like. The parish precept is set by considering the budget needed by the parish council to fulfil their obligations of, for example, maintenance at the grassroots level. For one parish council in the pilot study,

this meant a larger increase than usual for one year to fund the improvements but otherwise the rise is minimal (0% to 1%).

“But people are very sensitive around that [parish precept]. So, we have the right to put the precept up as much as we like. But we can’t [...] quite constrained and this year with Covid [...]” (Leeds parish council, pilot study 2020-21)

This relates to Arnstein’s (1969) ladder: the power parish councils have can be said to be influenced by the size of precept not (just) the size of parish council itself. Therefore, those parish councils with larger precept can exert a greater influence. The existence of super-parishes (Merrick, 2019) conveys that for parish councils there is perhaps no optimal size but rather factors that influence a size that they must make the most of, that is, do more with less.

“We never have the money that we would like to because there are always far more projects that need doing. The other- the second challenge, of course, is lack of levers to pull because we have very little statutory power.” (Leeds parish council, pilot study 2020-21)

6.6.2 Parish power and involvement

There are two aspects in relation to parish power and user involvement. Firstly, the extent and appropriateness of the degree of power that parish councils possess. Secondly, if this power is trickling down parish councils and, in turn, their residents. That is, do the general public also have their say and if yes to what extent?

There are two elements of parish power: the democratic voice and the precept raising ability. Whilst members of the public can and do lobby through, for example, petitions and protests, parish councils are a statutory consultee that are elected to represent the

views of the public. This is something that parish councils use to their advantage to put pressure on the principal authority.

“[...] fact we’re elected to become, I would say, a lobby group, a pressure group and a project group, perhaps on steroids. Because we can always say ‘hang on, we’re voted in’. Any other group that’s acting can’t say that, but we can.” (Leeds parish council, pilot study 2020-21)

However, this is not to say that parish councils have the sufficient power and funds to exercise their duties as much as they would like to. This is where some of the frustration that Arnstein (1969) mentions comes through. It also reflects a mismatch between expectation and method that Titter and McCallum (2006) highlighted in their work. The view that parish councils are somewhat powerless and feel this way came across very strongly in the pilot study interviews.

“So, the two frustrations are lack of money, lack of power and they’re huge frustrations.” (Leeds parish council, pilot study 2020-21)

Nevertheless, a unique power is perhaps the local knowledge that parish council offer for their area. Parish councils are consulted on major planning applications and developments. They aim to do what is best for the local parish community, despite potentially facing some NIMBY opposition.

“We’re a statutory consultee to provide local insight, local knowledge of what we think will be suitable.” (Leeds parish council, pilot study 2020-21)

It is also acknowledged Leeds parish councils do not want the level of responsibility and power that Leeds City Council and others possess. Although parish councils attend training courses, they are elected so unlike staff at principal authority there is no

recruitment process that means they must possess, say, professional qualifications before being interviewed and then hired. This relates to the Tritter and McCallum (2006) dynamic model that recognises that both lay people and professionals play a role and effective working bring that together in the 'mosaic'.

“Although we are elected representative, we’re not nec[essarily] we don’t have the professional qualifications” (Leeds parish council, pilot study 2020-21)

This then brings us onto public involvement. Whilst a parish council may not possess all the necessary qualifications, the public they represent are more diverse and larger so provide a breadth and depth of ability and knowledge. By involving and working together with the public and exercising their rights, parish councils are able to successfully challenge anything that the local public they represent are opposed to.

“But certainly, you know, there is the mindset and the professional ability within [redacted area] to challenge development of this [contentious] nature.” (Leeds parish council, pilot study 2020-21)

The interview questions on local communications (see Appendix 6) highlighted that some parish council communications are one-way as opposed to two-way communications. Although the public are invited to attend parish council meetings, they are not able to influence the decision making of the parish council. Often, attendance at meetings by the public is for the first 20-30 minutes of the parish council meetings. This suggests that the limited power of parish councils somewhat stops at the parish councils and the public may not be listened at governance level.

“They’re not public meetings. So, although the members of the public can come and they can hear what’s being said, that doesn’t entitle them to engage in debate with the parish council members.” (Leeds parish council, pilot study 2020-21)

Based on the literature, it is known that non-participation is another option, and some people may want this instead. There are people that do not engage with local government/politics. The Roch and Poister (2006) framework views voter registration as a measure of community attachment. Not everyone is equally attached to the community, so involvement differs, hence, we have participation vs non-participation.

“There is quite a large degree of apathy [...] But there are a number of individuals within [area redacted] that do want to be involved and understand the decisions that are being made.” (Leeds parish council, pilot study 2020-21)

6.6.3 Highways and communications

The advantage that parish councils have over principal authorities is their local knowledge. As Leeds City Council (2021b) employ 35,000 people, it is likely some level of decision making about local planning are made by people that do not live in Leeds. The grassroots governance of parish councils means they are best placed to advise on what will be suitable for their parish. The quote below highlights how the legal aspects do not fall within the remit of parish councils but how parish councils do play a role when considering the impact of housing on local highways.

“[...] we’re not looking to apply planning building regulations [...] not looking to apply planning law [...] we’re a statutory consultee to provide local insight, local knowledge e.g., what we think is suitable.” (Leeds parish council, pilot study 2020-21)

The Parish and Council Charter sets out how principal authorities and parish councils can best work together effectively (Leeds City Council, 2021a). As per the Charter, principal authorities recognise parish councils as democratic, independent, and a

statutory body that represent their residents. The question is whether this translates to joined up thinking between the parish councils and principal authorities.

“What we’re not seeing is any sort of joined up thinking to say well, collectively, the overall impact on road travel, it is X.” (Leeds parish council, pilot study 2020-21)

By seeing parish councils as separate entities, it is easy to overlook how decisions from one parish council can affect a neighbouring parish council. Whilst parish councils work together, there are certain decisions being made at the principal authority level. This implies that parish councils have little or no control when it comes to setting the strategic direction of highways, as this is done by the tier above.

Yet, parish councils can influence highways at a local level. The description of lobby group by parish councils of themselves means there is an important role of lobbying for parish councils. An example of this is speed reduction on local roads, which makes highways safer and can affect satisfaction with highways.

“So, we’ve been lobbying on our own and through the ward councillors for speed reduction. And we’ve managed to achieve that in quite a few places.” (Leeds parish council, pilot study 2020-21)

The parish councils also play a role in helping to achieve the vision of Leeds to be a green and child friendly city (Leeds City Council, 2021b). Whilst parish councils may lack sufficient resources, it is through focusing on low level aspects they make an impact, it is possible to argue. In other words, strategic direction is for Leeds City Council whilst the lower cost local change occurs at the parish council level. Hence, both of these levels of governance play a complementary role to work together effectively. This relates to

Tritter and McCallum (2006) on the mosaic and the different roles various groups play to understand the whole picture, in this case, of Leeds.

“[...] putting in planters to slow down traffic or create more space for pedestrians. All that kind of thing. Very low cost stuff.” (Leeds parish council, pilot study 2021)

6.6.4 Summary

There were three themes informally identified from the pilot study interviews: the role of parish councils, parish power and involvement, then the more specific highways and communications. There is a role for parish councils to play (generally, not just in Leeds) in influencing satisfaction with local highways. This is done via effective communications with both the public and principal authorities.

However, there are a few caveats associated with this: the resources available to parish councils, the support from and relationship with LAs and the nature of communications. The key thing that comes across from the interviews is the need for two-ways communications and listening to the public/experts as needed. This is corroborated by the critique of Arnstein (1969), with the critique also highlighting the importance of allowing for different levels of citizen engagement.

Ultimately, parish councils, much like principal authorities, must make their own decisions in the best interests of everyone (so not just the most vocal individuals, for example, NIMBY groups). This is because parish councils represent the entire parish not their own interests, as they are a statutory body. There is transparency as the minutes of the parish council meetings are published on parish council websites and there is communication via newsletters and community notice boards. This is important to help

the public to realise the following: parish councils serve a key purpose, they can influence principal authorities to some extent, and they have a legal basis to act.

6.7 Conclusions

The question we set out to answer is whether or not parish council communications positively affect satisfaction with highways. The inclusion of communications within previous framework of CQC, for example, highlights the importance of effective and regular communications as a driver of satisfaction with local highways. Furthermore, communications help parish councils to serve the residents. Thus, it is not inconceivable to argue that through good communications (but not highways maintenance as that is the role of principal authorities) parish councils then influence satisfaction with highways.

It is acknowledged our pilot study does not explicitly measure satisfaction. Yet, individual parish councils will undertake annual satisfaction surveys or measure public attitudes towards the parish council. Thus, there is scope for parish councils to think about how this work could apply to their area. This will then help to enhance our knowledge and understanding of local highways with respect to the role of parish vs principal authorities.

The seminal work of Arnstein (1969), although critiqued, has recognised that token gestures are an occurrence in citizen involvement, which is significant for our work in two ways. Firstly, the power dynamics between principal authorities (LAs) vs parish councils. Secondly, the extent of involvement or engagement when considering parish councils and residents having their say. That is, does the power filter down and how can each play a complimentary role to bring about positive change? We consider this key question in the next few paragraphs of this sub-section.

Parish councils are a statutory body, and the Parish and Council charter outlines how principal authorities and parish councils should work together (see, for example, Leeds City Council, 2021a). There are powers that parish councils are able to fulfil, for example, taking on the responsibility of responding to consultations on behalf of their residents, so exercise some powers as a statutory body (Newman, 2005). In that respect then, it seems parish councils are not purely a token gesture used to keep the community happy.

In relation to highways, it appears the 'power' of parish councils is more about communications with principal authorities. This is either directly or more often via local councillors, which can include passing on views of the public that the parish represent. In our case, parish councils tend to be about more low-level powers, unless they become a super parish council (Merrick, 2019); this would mean a large increase in the parish precept, which has equity implications, though this is beyond the scope of this research. Nevertheless, parish councils act as a conduit between the public and principal authorities and are recognised as being a democratic voice.

When it comes to the relationship between the parish councils and their residents, again, communications is important. There is little evidence of one-way communications from parish councils and only if a situation warrants it, such as, to impart information that does not require discussion. This is positive and means parish councils are open to dialogue.

Whilst there is two-way communications, parish councils recognise not everyone will want to be involved in local decision-making so must be cautious of not just representing the majority. That is, it is not just about who is most expressive when it comes to

considering the views of the public. This relates back to NIMBY as one resident or group may not be happy, but the parish council has to do what is best for the whole community to ensure resident satisfaction (Hamersma et al., 2018). Thus, two way communications between public and parish councils are informative, to an extent, but then parish councils act independently when feeding this back to the principal authority. Thus, at all levels of governance, a power/involvement relationship exists, but ideally at an appropriate level.

6.7.1 Balancing the lower levels of governance

For simplicity, the research chapters assessed two levels of local governance separately (in our case, LAs and parishes). Although, it is acknowledged that links exist between the different levels of governance. This sub-section explores the link between the lower levels of governance, that are below central governance, and as looked at in this thesis.

The conduit role of parish councils can be diminished if there is a lack of support and/or communications with principal authorities. While the parish council charter sets out how local councils and principal authorities work together, in reality, it varies from LA to LA. However, with respect to contentious issues, such as, housing development, the support from principal authorities may not be as forthcoming if/when the parish councils reject it.

A challenging situation, such as the aforementioned one, occurs because the principal authorities act in the best interests and needs of the entire population of an area. Whereas a parish council is only representing and acting for the public in their small parish area. This is not to say that the views of parish councils do not matter. But rather than there can be tensions and it is important for principal authorities to balance these. Namely, the needs and interests of the entire principal authority vs the local expertise and democratic role that parish councils brings to an issue that affects their area most.

As the Leeds parish council analysis is a pilot study, the remainder of this chapter looks at the limitations and further research. The idea of the further research is to outline how the pilot study can be developed into a full scale study of parish councils in England. It does this by exploring quantitative methods that could complement the existing rich data.

6.7.2 Limitations and further research

The limitations of this research include low response rate, pilot study and potential saturation. The strengths of this study lies in the richness of interview data, the focus on highways (novel) and being able to tell a more complete story given this forms part of a thesis that also looks at principal authorities. Overall, parish councils can and want to do more (willingness is evident), which requires funds and support from principal authorities.

In terms of further research, there is a need to build on this study with a larger sample. It also highlights the necessity of more research that looks at highways specifically and not just at parish councils generally. Our interviews did not ask about the future of parish councils, which is worth considering.

There were a number of follow up questions that arose from the pilot study interviews undertaken with Leeds parish councils. In no particular order: future of parish councils, influence on local sustainability (environmental or financial sustainability) and why parish councils exist (their role)? The latter arises from the saturation issue where parish councils gave similar answers to the existing literature. By framing the interview question differently, it is hoped answers are more about *perception* of the role of parish councils.

Additionally, at the time of writing, London only has one parish council. This is despite a 2007 Act allowing parish councils to now form in London (Sandford, 2019). This implies that some areas may be more suited to parish councils than others, which involves considering how parish councils fulfil the needs of the public. In considering future work, the focus is on other methods so as to expand on initial findings of the Leeds pilot study.

6.7.3 Univariate or statistical analysis

The decision to not undertake any univariate or regression analysis prior to the pilot study was deliberate to avoid introducing any bias. If, for example, it was found that parished areas are more satisfied than unparished areas, this may have unconsciously influenced the interviews. It was also felt that rich data was needed, hence, we opted for an interview method, but statistical analysis can help to corroborate the pilot study findings, as below.

In terms of satisfaction, participating NHT LAs undertake the following themselves:

- Compare satisfaction of parished areas vs unparished areas (does a parish council mean higher satisfaction?)
- Look at the % urban or rural roads (are some areas suited to parish councils?)
- Car owner vs non-car users with respect to satisfaction (the role of expectations?)

The above list of potential future research is not exhaustive. It recognises that some data is available to individual LAs that is not found in the public domain for research. LAs that participate in the NHT satisfaction survey can use their individual responses dataset and then draw upon the aggregate level analysis undertaken in the previous chapter. This would allow LAs to facilitate their own research into LA and parish level governance to better understand how the two interact.

As the latter is an under-researched area with respect to highways, there is scope for LAs to partner with each other to conduct this research. For example, LAs in combined authorities may want to pool their data and/or work together to inform future research. There is also potential for collaboration between the different tiers of governance to better inform and shape what future analysis could look like in relation to local highways.

6.7.4 Spatial analysis using ArcGIS

There could be parish analysis in the form of spatial analysis that uses Geographic Information Systems (GIS) to look at a) the presence of parish councils and b) proximity to parish councils. In terms of the latter, this would be about exploring whether or not those in neighbouring areas without a parish council benefit from being next to an area with a parish council. Also, do the areas with parish councils differ to areas without one?

The spatial analysis of parish councils using ArcGIS would require funds to obtain parish maps unless a local council already has access to it for their parish. To date, we have looked at the influence of the parish councils on the parish itself. As parish councils work on schemes or input on housing developments that affect other local areas (positively or negatively), this suggests that parish council reach may extend to areas without a parish council. By combining parish spatial data sets with the NHT data mentioned above, there is scope to undertake spatial analysis for various aspects, as in the next few paragraphs.

Firstly, the presence of parish councils. It may be that living in a parish council area alone is sufficient. Or it could be that living somewhere that has a parish council and is surrounded by parish councils has the most impact on satisfaction as neighbouring

councils work together. It is anticipated that spatial analysis will help us to assess if a presence alone of parishes can help satisfaction.

Secondly, there is proximity of parish councils. There may be areas without a parish council but that benefit from being close to a parish council. Whilst our interviews have been useful to explore the influence of parish councils, an unanswered question is one of its reach. That is, is there a parish ripple effect?

Finally, another P of relevance is proactiveness. By undertaking more interviews, it would be possible to categorise parish councils. A higher number would be attached to a parish council that has good two way communications and thus greater influence on highways.

For example, as a matrix with four quadrants that looks at communications (one way or two way) and highways involvement (low or high) for a parish. The Table below posits four potential categories that parish councils could fall into. This would allow future work into how parish features may affect satisfaction with highways among the general public.

Table 28: Potential categorisation of parish councils

	One way communications	Two way communications
Low highways involvement	Broadcaster	Listener
High highway involvement	One-way road	Powerful

7 Conclusion

7.1 Introduction

This thesis has looked at satisfaction with local highways through the lens of both central governance (DfT) and local governance (principal (local) authorities and local (parish) councils). Therefore, Chapter 7 concludes this thesis on the assessment of the role of governance in relation to assessing public satisfaction with local highways in England. The structure of this final chapter is as follows. Section 7.2 explores how the overall aim was met, with respect to the research objectives. This is followed by Section 7.3 on the contributions, implications and limitations, at the research chapter level and at an overall thesis level. Finally, Section 7.4 outlines the future research, which will build on this work.

The overall aim of the thesis was to investigate how different levels of governance can play a role in influencing public satisfaction with local highways in England. In order to ascertain the different roles of levels of governance, in turn, this thesis explored the role of central government, principal authorities and parish councils. Although, in reality, the governance of England is dynamic, as was highlighted in the Introduction chapter. The aforementioned thesis aim translated to three research objectives and an assessment of the research chapters against these research objectives is found in the next sub-section.

7.1.1 Over-arching learnings from the thesis

There are some over-arching learnings from this thesis as a whole. The Figure below helps to summarise the different levels of governance in England, as explored in this thesis. This is in relation to their link with the governance level above (first column), how each level can work with the governance level below (middle column) and their role in influencing highways satisfaction (last column).

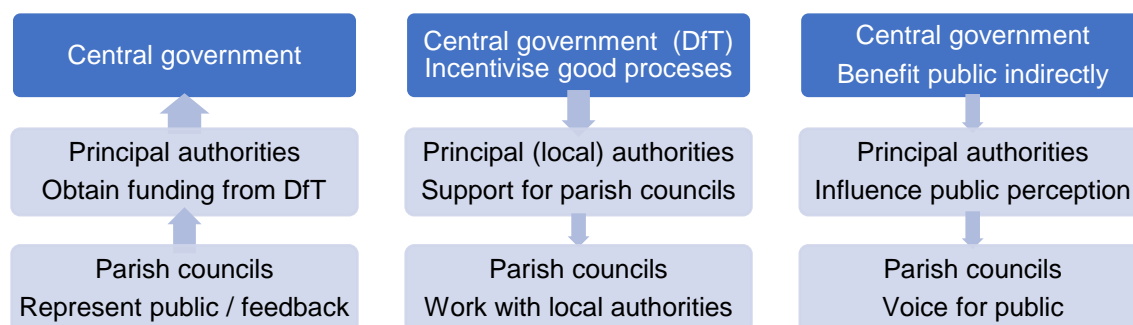


Figure 14: Role of different levels of governance

The overall implication is that different levels of governance have complementary roles to play in relation to satisfaction with local highways in England. The role of the DfT as the main source of funding for LAs and providing the strategic overview to benefit public satisfaction indirectly is clear cut. Yet, there is uncertainty about the scope for incentives in highways, implying that future iterations can benefit from learnings in the other sectors.

Another implication of the Figure above might be that those in areas from parish councils 'miss out' compared to areas without a parish council. However, this is not necessarily the case. The important thing is a well-functioning local government that may consist of one or more of these: principal (local) authority, combined authority and/or a local council. It remains key that parish councils, if they exist in an area, are supported and are active. However, our research indicates that support from principal authorities and how engaged parish councils are can vary, which has implications for assessing highways satisfaction.

7.2 Assessment against research objectives

This sub-section is a brief synopsis about how the research objectives, set out in Section 1.4, contributed to meeting the thesis aim. It does this by listing the research objectives and then considering the key finding(s) that were most relevant to the objectives. This is complemented by Section 7.3 that follows and looks in further detail at the contributions and implications of what the research has found.

7.2.1 Incentivising by central government (DfT)

Relevant objective:

- How should funders incentivise an array of measures from quality assets to customer satisfaction? More specifically, to determine the relationship (if any) that exists between the DfT Highways Incentive Fund and given highways measures.

The objective of research chapter one (Chapter 4) was to review performance schemes in transport and other sectors, with a particular focus on the DfT (2016) Highways Incentive Fund. This allowed us to assess how best to incentivise performance, in this case, incentivise local authorities to deliver well on processes related to local highways.

The key finding of this chapter was that there is little statistically significant relationship between the DfT Highways Incentive Fund criteria and local highways performance. It is hypothesised that the lack of a clear finding of a relationship between the DfT Incentive Fund and highway outcomes is due to the structure of the Incentive Fund. From

the outset, the DfT Incentive Fund evaluation framework has focused on process alone, thus, leading to a framework where outcomes do not play a role in this Incentive Fund.

To the extent that outcomes matter, the analysis on incentivising satisfaction contributed to the overall thesis aim. This was achieved through a robust OLS regression analysis, which can be replicated. Yet, from this research alone, it is unclear how or if penalties affect performance. A part of this is that penalties (i.e., disincentives) are used to a lesser extent for organisation, tending to play more of a role for individuals. Whilst our research advocates outcomes for a Highways Incentive Fund, it is not clear at what level to set targets based on these given highway outcomes.

7.2.2 Highways perception – principal authorities

Relevant objective:

- Does public satisfaction respond to asset conditions changes or is this not perceived? More specifically, to investigate whether or not the public perceive good local highways asset management and the implications of this.

The second research chapter (Chapter 5) assessed whether or not the public perceive good road conditions. That is, is public satisfaction within principal authority control via improved road conditions or do external factors, such as, demographics have more of an impact? This chapter built on previous research on determinants of public satisfaction with highways. The model developed drew upon the Roch and Poister (2006) explicit equation for satisfaction with public services to highways by bringing in road conditions, road network in KM and other variables.

Whilst Pinkney and Marsden (2013) conducted a univariate analysis of satisfaction and road conditions, a multivariate analysis of satisfaction and various highways aspects was achieved in this thesis. A clear finding was the statistically significant relationship found in Chapter 5 between better road network and highways satisfaction. The contribution of this second research chapter was the development of a model that quantifies the magnitude of the impact on satisfaction with highways, which can be used by principal authorities to make a case for funding local roads when applying for competitive funding.

7.2.3 Influencing satisfaction via parish councils

Relevant objective:

- What roles do different levels of governance play in influencing public satisfaction? More specifically, to understand (better) the extent to which parish councils can impact on satisfaction with highways by engaging citizens.

The final research chapter (Chapter 6) explored the role of parish councils (recall parish councils are the tier below local authorities) on influencing satisfaction with highways. This chapter utilised individual respondent data (i.e., parish councils), which contrasts with the aggregate LA data used in the previous chapters. The previous research on parish councils in England has either looked broadly at the role of parish councils as a whole or a specific area, for example, Milton Keynes as per Godfrey (2007). There is no focus on the role of parish councils within local highways, hence, the contribution of the penultimate chapter.

In terms of the research objective, there is a role for parish councils to play and so the form this takes is what is most important. The qualitative research involved undertaking

interviews with parish councils in Leeds. A key finding is that parish council can act as a conduit between the public and higher tiers of governance, in relation to local highways.

As parish councils are not directly responsible for highways maintenance, they can focus on effective communications with the public. This is a vital role especially given the grassroots nature of parish councils that means they are the governance tier of the ELRN that is closest to the public. It also means that parish council have that local context, and more so than other governance levels, as all/most members of the parish reside in the parish area. Whereas Leeds City Council (n.d.) has 100,000 people that travel in from other areas with some residing outside of the area but employed by Leeds City Council.

7.3 Contributions, implications and limitations

The main contribution of this thesis was a detailed analysis of the different facets of local highways satisfaction to best ascertain the varied role of levels of governance in England. This thesis has focused on three levels of governance in England: central government, principal authorities and parish councils. In some countries, this translates to national government, municipalities and grassroots governance, respectively (as in Appendix 2).

There are also combined authorities in England (LGA, n.d.), which maps to regional authorities in other countries (Scottish Government, 2021). This can make it a challenge to assess the role of governance in relation to satisfaction with highways. That is, some areas in England are simultaneously part of a combined authority, principal authority and parish council (with SRN overseen by National Highways (formerly Highways England)).

7.3.1 Central governance – DfT Incentive Fund

Chapter 4 undertook a quantitative analysis of the DfT (2016) Highways Incentive Fund, that is an under-research area. The one research study that looks at the Incentive Fund (there may be others not found from the literature review) only considers resilience and not any other aspects (Shah and Axelsen, 2016). Further, their research concluded in 2016 so was unable to assess the impact of the first few years of the DfT (2016) Incentive Fund, as this thesis does. A focus by Shah and Axelsen (2016) on asset management justifies this research, which aimed to move away from asset condition measures alone.

The work with DfT (2016) Highways Incentive Fund perhaps relates most closely to the LTPs mentioned earlier in this thesis. Whilst there are no longer more rounds of LTPs, the development of a long-term Transport Strategy or Transport Policy for LAs is still a common occurrence. These tend to be longer than the five year period covered by LTPs. For example, Leeds City Council has Transport Strategy 2040, that is 18 years from now at the time of thesis submission. Although the fulfilment of such a Transport Strategy does not yield any incentive funding, LAs can consider how best to deliver on their own version of an LTP. That is, there are learnings from LTPs and the DfT (2016) Incentive Fund that could help LAs to assess their performance against a Transport Strategy/Plan.

One of the key learning from LTP is about the use of appropriate outcomes. A criticism of the DfT (2016) Incentive Fund was that it did not provide a level playing field among LAs. Yet, LAs have valuable knowledge of their local context. Thus, perhaps LAs can set themselves feasible outcomes to attain, considering their size and access to resources.

A strength of the DfT (2016) Incentive Fund was that it encouraged LAs to adopt best practice for processes. These good processes alone may not yield outcomes but can be

used in combination with metrics that LAs set themselves, for maximum impact. This can encourage LAs to develop in weak areas, such as, resilience or effective communication.

For example, as seen in Appendix 4, the three aspects of the customer strand encourage LAs to consider effective communication. Firstly, the listening element that is about using insights from a customer satisfaction survey to help bring about service improvements. Secondly, the existence of a feedback mechanism and utilising information obtained from it. Lastly, the need to keep customers informed and looking at how LAs can ensure this.

Another feature of the DfT (2016) Incentive Fund that makes it distinct from the other incentive schemes is its absence of a penalty. Note, the attainment of a lower level of incentive funding, as opposed to maximum funding, is seen as a disincentive not penalty. The implication is that reward alone (maximum incentive funding and good process) is insufficient, and outcomes are also needed.

7.3.2 Local governance – principal authorities

The contribution for Chapter 5 is the application of unique NHT satisfaction data and the explicit statement of Roch and Poister (2006) to understand perception of local highways. This, in turn, adds to the understanding of public satisfaction with highways authorities. The relevant area of the Literature Review I chapter is the work of Giese et al. (2001) on beliefs as an intermediary component between the condition of assets and satisfaction.

In other words, is it enough to improve road condition or is influencing beliefs part of the local authority remit if they want to yield a higher level of satisfaction amongst the public? In this research, the former seems to be more the case, but it is implied that managing expectations are vital. The question that remains is whether it should be the LGA and/or

a tier of governance (DfT, LAs, parish councils or other) that will have the most impact in educating the public on what is feasible for highways and to attain realistic expectations.

The education of the public to (hopefully) yield realistic expectations is influenced by the tier of governance. National Highways (who are closest to the DfT) can communicate a funding shortfall or highlight the extent of problems with potholes, at a national level. This is something that principal authorities themselves can do but the public may perceive a funding shortfall or extent of potholes as being a mismanagement issue, specific to that principal authority, and not a national issue.

The one thing that principal authorities can do with respect to realistic expectations is to justify spending and communicate how funding was allocated across the public services. Given that principal authorities are a form of local governance that is universal, it makes sense for this type of communications to come from them. Finally, where parish councils exist, their aim is to manage expectations in relation to what principal authority can do. This will help educate the public that what is realistic is due to funding not local politics. It would appear they all can play a role. Hence, it is about which governance level (if any) the public trust the most, which is likely to vary according to the individual(s) in question.

When it comes to implications, there appears to be a divide in the literature as to whether demographics have no/little impact on satisfaction or have some impact on satisfaction. The former would imply LAs have little influence over expectations. Whereas the latter suggests there is a role for LAs to play in influencing expectations, by targeting certain demographics to manage their expectations. While our research found demographics do impact on satisfaction, the main finding is that LAs can still influence satisfaction through improved road conditions. In addition, this thesis has used demographics as a proxy for

expectations while other research measured expectations explicitly for use in their study. There are always external factors present that influence public satisfaction. This means policy should focus on what is within LA control to maximise satisfaction with highways.

7.3.3 Local governance – parish councils

In terms of Chapter 6, there has been little research on parish councils and highways, which is a contribution of that research chapter. Another contribution is drawing upon the various citizen participation models to better understand the role of communications in relation to local highways satisfaction. Whilst the NHT satisfaction survey and the DfT (2016) Incentive Fund include communication, these datasets contribute little to the discussion on how communications works in practice. Hence, the final research chapter contributes to the literature on highways, grassroots governance and citizen participation.

With respect to grassroots governance, the NIMBY phenomenon is something that is found internationally (for example, Hamersma et al., (2018) who looked at Netherlands). While NIMBY is not an official form of governance, the issue is that NIMBYism becomes conflated with established forms of grassroots governance, such as, tenants association. In England, they are more prevalent in London and known as resident association. There is potential for a resident association to adopt roads (take on its ownership), at least in England. More broadly, in an international context, the presence of NIMBY complicates matters as other forms of grassroots governance may be seen as politically contentious. This may discourage others from setting up grassroots governance or may make it more difficult to be heard by higher governance tiers (whatever form that takes in their country).

There are two main implication of the qualitative parish council pilot study conducted in this thesis. Firstly, there is not necessarily a need for more parish councils but the ones

that exist must be empowered to work effectively and communicate with the public, local authorities and the DfT. Within the grassroots governance literature, there is a tendency to, for example, present parish councils as an ambitious and powerful governance level.

However, as gleaned from this research, this is not the case due to lack of support and funds. Secondly, the importance of two way communications: the public should engage with the parish council and vice-versa, two-way communications used appropriately to ensure the public are listened to (and feel they are listened to). A two-way approach also means that principal authorities need to work more with parish councils and vice-versa.

Having considered the implications, the next section is on limitations that broadly apply to the whole thesis. This is to provide context for the research contributions outlined in this section earlier. Overall, the research is robust, contributes to the literature on local highways and governance, and uses data or methods other highways research does not. Overall, this thesis may help to guide policy decisions, can be used to highlight the need to merge LAs or to increase parish council presence through greater support or numbers.

7.3.4 Limitations related to the whole thesis

The limitations specific to the three research chapters are contained in their respective chapters. As mentioned in the introduction chapter, London is a unique case in transport. This means that some conclusions may not be as applicable to London. Despite this, the generic learnings on satisfaction can still help to improve satisfaction in London. More specifically, this thesis could then inform an analysis of the TLRN satisfaction survey, for example, an exploration of the relationships between public perception and satisfaction.

With the exception of the pilot study of Leeds parish councils, the research studies have been of a large sample size that provides extensive coverage of the ELRN. Yet, one of the drawbacks of an aggregate LHA analysis is the loss of a data point if any data for that year is missing. The potential to interpolate data, to overcome missing points, has to be balanced with the need for good quality data that is a true reflection of the data for available for analysis.

As alluded to previously, the sample profile relies on opt-in from the participants. Even the DfT (2016) Incentive Fund, although not opt-in, has certain exceptions that mean that only some are represented. All of this means that some LAs and areas of England will be more represented in the datasets used for analysis. This is the nature of survey data.

However, the research limitations around sampling are overcome by the strengths of the quantitative data. These strengths are: standardisation of key measures to allow for the comparison between LAs and over time, increased participation in the NHT and the CQC over the years as they both increased in reputation, and the fact that that this data is not publicly available, so analysis is limited to those with access.

The large samples used for regression methods allow for robust data for analysis, but a limitation is the lack of qualitative data to help explain results. The use of secondary data means fieldwork has been undertaken already but this limits analysis to whatever the source of the data deemed as being the most important to obtain findings on. There are learnings to be gained from best practice or case studies that are qualitative in nature, yet also learnings gained from undertaking a robust multi-variate analysis of many LHAs.

The timings of the interviews with parish councils was affected by the pandemic. There were mitigating actions taken to limit the impact of Covid-19 on the study of parish councils. This was detailed in Chapter 6 so is not repeated here.

7.4 Further research on England highways

Overall, in terms of future work, there needs to be more research on highways in England to understand satisfaction and ensure the appropriateness of different functions/roles for the different levels of governance. With Chapter 4 on incentivising public satisfaction, the future research could take the form of exploring how incentivising may differ for devolved LAs vs those LAs not devolved. For Chapter 5, future work could explore metrics similar to satisfaction that LAs can control, such as, communications and how to use it alongside asset management metrics. Section 6.8 has outlined the further research for Chapter 6.

In terms of directions for future research, this has already been outlined in Chapters 4, 5 and 6 on incentivising, perceiving and on influencing highways satisfaction respectively. Overall, there are broader ways to build on the research undertaken in this thesis. The remainder of this sub-section considers how best to build on this work on local highways.

The analysis of the DfT (2016) Incentive Fund conducted in this thesis was a multi-variate analysis that used data from the CQC efficiency network combined with Incentive Fund data. This is not to say a) univariate analysis is not valid and b) quantitative analysis is the only way to assess an incentive scheme. There could be qualitative research that takes the form of case studies looking at the evidence that LAs present for the DfT (2016) Incentive Fund. This could help to inform best practice of processes and potentially how that could translate to outcomes too. The latter being something that is perhaps missing from the current iteration of the DfT (2016) Highways Incentive Fund that ran till 2021/22.

Given the constraints faced at all levels of governance, further research practice could involve running and analysing potential simulations. This would make use of publicly available quantitative data from the ONS, the DfT and similar. In an ever changing world, the impact on highways of a new housing development, population growth or additional DfT funding can be assessed via a simulation.

While there can be a tendency for previous research on satisfaction and local highways to be quantitative analysis, there is scope for qualitative research and/or mixed methods. The type of qualitative research depends on the nature of the research being conducted. In terms of best practice, this could take the form of case studies, as is the case with the top performers of the NHT Network satisfaction survey. There is little/no research on best practice in terms of parish councils and influencing highways satisfaction via effective communications. This qualitative research can take the form of an interview, focus group and/or case study.

When assessing satisfaction, the concern is that there is a focus on the public alone. This overlooks the learnings can be gained from researching those that are involved with highways locally, namely, the principal authorities and local councils in England. Overall, in England and internationally, there is a need to better understand the changing and dynamic relationship between different levels of governance and champion citizen voice.

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Bury*	Metropolitan	Y	Y	Y	Y							Y	Y
Calderdale	Metropolitan	Y	Y	Y	Y						Y	Y	Y
Cambridgeshire	County	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Central Bedfordshire	Unitary				Y	Y	Y			Y	Y	Y	Y
Cheshire East	Unitary	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cheshire West and Chester	Unitary	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y
Cornwall*	Unitary				Y								
Coventry*	District	Y	Y	Y	Y	Y					Y	Y	Y
Cumbria	County	Y	Y	Y	Y	Y	Y				Y	Y	Y
Darlington*	Unitary	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Derby City	Unitary				Y								
Derbyshire	County	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Devon	County		Y	Y	Y								
Doncaster*	Metropolitan	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Dorset	Unitary	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y
Dudley*	Metropolitan				Y							Y	Y

Durham	Unitary	Y	Y	Y	Y	Y	Y	Y		Y		Y	
East Riding of Yorkshire	Unitary	Y	Y	Y	Y	Y	Y	Y		Y		Y	Y
East Sussex	County	Y	Y	Y	Y		Y	Y		Y	Y	Y	Y
Essex	County	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Gateshead	Metropolitan	Y	Y		Y	Y		Y		Y	Y	Y	Y
Gloucestershire	County				Y								
Hackney	London					Y				Y	Y	Y	
Halton*	Unitary				Y								
Hampshire	County	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Hartlepool*	Unitary	Y	Y	Y	Y	Y		Y			Y	Y	Y
Herefordshire	Unitary	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Hertfordshire	County	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Kent	County	Y	Y	Y	Y								
Kingston-Upon-Hull	Unitary	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Kirklees	Metropolitan	Y	Y		Y						Y	Y	Y
Knowsley*	Metropolitan				Y								

North Yorkshire	County	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Northamptonshire	County	Y	Y	Y	Y	Y	Y	Y	Y		Y		Y
Northumberland	Unitary	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Nottingham City	Unitary				Y								
Nottinghamshire	County		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Oldham*	Metropolitan	Y	Y	Y	Y						Y	Y	Y
Oxfordshire	County	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Peterborough	Unitary	Y	Y	Y	Y			Y			Y	Y	Y
Plymouth	Unitary	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Poole	Unitary	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y
Portsmouth	Unitary				Y								
Reading	Unitary				Y								
Redcar & Cleveland*	Unitary	Y	Y	Y	Y	Y					Y	Y	Y
Rochdale*	Metropolitan	Y	Y		Y						Y	Y	Y
Rotherham*	Metropolitan	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Rutland	Unitary				Y								

Windsor & Maidenhead	Unitary				Y								
Wirral*	Metropolitan				Y								
Wokingham	Unitary	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y
Wolverhampton*	Metropolitan	Y	Y		Y						Y	Y	Y
Worcestershire	County	Y	Y	Y	Y	Y					Y	Y	Y
York	Unitary				Y								

Source: own summary of our collated dataset. *Devolved LAs that have transfer of powers to local level and obtain maximum incentive funding.

Table 30: LAs not in collated dataset, due to availability of data (mostly London)

Barking & Dagenham	City of London	Harrow	Kensington & Chelsea	Sheffield
Barnet	Croydon	Havering	Kingston Upon Thames	Southwark
Bexley	Ealing	Hillingdon	Lambeth	Sutton
Birmingham	Enfield	Hounslow	Lewisham	Tower Hamlets
Brent	Greenwich	Isle of Wight UA	Merton	Waltham Forest
Bromley	Hammersmith & Fulham	Isles of Scilly	Newham	Wandsworth
Camden	Haringey	Islington	Richmond upon Thames	Westminster

Appendix 2: England governance vs other countries

Table 31: England governance compared to other countries

Country / population	Brief history of governance and current local politics	Key reforms in local governance	Current structure and how local governance operates	Main income sources in local governance
England 56.3 million in 2020	Latest reforms were in 2000s. Period between major reforms in late 19 th century and 1974 law saw no/little changes	1974 law aimed to standardise & simplify by only having two levels of governance.	Most two levels (county & district councils). Otherwise, a UA (one level). Varied structure and LA sizes.	Main income from central government. Local income mostly via taxation & fees from property & businesses.
	Mayors elected for combined authorities. Most councils led by a single political party. First past the post for elected councillors	But latest reforms in 2000s gave rise to more complex (varied) local governance.	Combined authority (large third level) and/or a parish or town council (small, fourth level) in some areas.	Parish councils distinct from other countries & levels due to their power to raise own revenue inc. extra charge (a precept) on the council tax

Scotland 5.5 million in 2020	<p>Again, local governance was largely unchanged around 19th century until reforms</p> <p>No mayors (unlike England). Again, presence of political parties in local governance. But councils elected through proportional representation.</p>	<p>The combining of municipals (as also seen internationally) streamlined Scotland in 1996. This resulted in just one level of governance, in contrast with variation in England.</p>	<p>As also found in England, a one level UA (32 in total across Scotland).</p> <p>Just as with England, local authorities vary widely in size. This ranges from 20,000 people to 600,000. Although, most are over 100,000 people</p>	<p>Main source of income (just over 50%) comes from government grants</p> <p>Around 20% each mainly from property tax and business tax. Hence, a very similar funding arrangement to England.</p>
Denmark 5.8 million in 2020	<p>Again, local governance was largely unchanged around 19th century until reforms</p> <p>Denmark sees councillors (not public) elect mayors. An elected council in municipals.</p>	<p>Reforms in 1970 and 2007 saw changes to the number and size of municipalities. Due to amalgamation, they are larger (so fewer of them).</p>	<p>Two level system (as mainly in England) in Denmark of regions & municipalities</p> <p>Standard size of 55,000 people across municipalities (in contrast to varied sizes)</p>	<p>Income mostly from local taxation complemented by property & business tax</p> <p>As with Scotland, government grants but only 25%. Other income - local fees & services</p>

Germany 83 million in 2020	From the 19 th century, no/little change prior to reforms in 1960s and then unification.	As with Denmark, a trend of municipal amalgamation has increased their size while also reducing their number.	Another two level system. This time of municipalities and districts (area-state/land) level	Again, main income from a higher level (area-state (land) grants and taxes).
	Directly elected mayors have responsibility for municipals. Councils are led by coalition.		Municipal size varies widely (so similar to England and Scotland but not Denmark)	No property tax as source of income but business tax is a primary source of tax income
New Zealand 4.9 million in 2020	As with other countries, local governance unchanged for most part from 19 th century. This is until reforms in 1989.	Again, reforms via municipal amalgamation and also municipal rationalisation	Two levels: regional councils and territorial councils Again, variation in population size from 1,415,000 to just 600. So, on average, around 30,000 people for territorial.	Absence of government blocks of funding/grants. Similar sources of funding to other countries above: mainly property tax but income arises from local fees & services too.
	Mayors are directly led but do not possess executive power & oversee territorial councils.			

Quebec 8.5 million in 2020	Again, 1960s reform made for a broadly similar structure around the mid-19 th century.	1960s reform saw trend for amalgamated municipalities also take place in this country.	Three levels: administrative regions, regional country municipalities & municipalities	Primary source of income is property tax and services (similar to other countries).
	Another elected mayor but with some executive power & mayors lead the municipalities	Focus towards urban areas in the 2000s led to a new level of metropolitan governance	Varies widely in size from 2000 to 100,000 people. Less than 10,000 in some areas.	Little income from provincial government grant (as mostly from sources listed above).
Uruguay 3.5 million in 2020	Dictatorship from 1973-1984. Early 20 th century reform established a democracy.	Following military dictatorship, a gradual move towards awarding power to locally elected municipalities. This	A two level system formed of departments & municipalities	The majority of income for municipals comes directly from central government.
	Elected mayors (no executive power like New Zealand) of municipalities. Governors elected to lead departments.	involved both constitutional and legal reform to formalise the decentralising of powers.	Municipalities only cover around 70% of population & mostly found in urban areas. Compulsory in areas where population is 2000+ people.	Remainder income sourced from departments following budget allocations so this part of income can vary widely.

Source: own summary of Scottish Government (2021: 4-10) governance review. N.B. grassroots governance is compared in Chapter 6.

Appendix 3: Satisfaction components of NRPS

Table 32: Station and train facilities to calculate overall satisfaction

Station Facilities	Train Facilities
Overall satisfaction with the station	Overall satisfaction with the train
Ticket buying facilities	The frequency of the trains on that route
Provision of information about train times/platforms	Punctuality/reliability (i.e. the train arriving/departing on time)
The upkeep/repair of the station buildings/platforms	The length of time the journey was scheduled to take (speed)
Cleanliness	Connections with other train services
The facilities and services	The value for money of the price of your ticket
The attitudes and helpfulness of the staff	Upkeep and repair of the train
Connections with other forms of public transport	The provision of information during the journey
Facilities for car parking	The helpfulness and attitude of staff on train
Overall environment	The space for luggage
Your personal security whilst using the station	The toilet facilities
The availability of staff	Sufficient room for all passengers to sit/stand
The provision of shelter facilities	The comfort of the seating area
Availability of seating	The ease of being able to get on and off
How request to station staff was handled	Your personal security on board
The choice of shops/eating/drinking facilities available	The cleanliness of the inside
	The cleanliness of the outside
	The availability of staff
	How well train company deals with delays

Source: NRPS (2016: 9).

Appendix 4: Questions by DfT strand

Table 33: DfT Incentive Fund questions by strand

Strand	Questions from Incentive Fund self-assessment questionnaire
Asset management	<p>Q1. Does your local authority have an asset management policy and strategy for its highway infrastructure?</p> <p>Q2. Has your local authority communicated its approach to highway infrastructure asset management?</p> <p>Q3. Does your local authority have a performance management framework and maintenance regime that supports its highway infrastructure asset management strategy and continuous improvement?</p> <p>Q4. Does your local authority have an effective regime to manage its highway infrastructure asset data?</p> <p>Q5. Is your local authority undertaking lifecycle planning as part of its highway infrastructure asset management?</p> <p>Q6. Is your authority able to demonstrate leadership and commitment from senior decision makers in taking forward its highway infrastructure asset management approach?</p> <p>Q7. Has your local authority identified the appropriate competencies required for highway infrastructure asset management and what training may be required?</p> <p>Q8. Does your local authority have a comprehensive approach to managing current and future risks associated with the highway infrastructure assets?</p>

- Resilience Q9. Has your local authority established a resilient network as recommended by the 2014 Transport Resilience Review?
- Q10. Has your local authority implemented the relevant recommendations of the 2012 HMEP Potholes Review - Prevention and a Better Cure?
- Q11. Has your local authority implemented the relevant recommendations of the 2012 HMEP Guidance on the Management of Highway Drainage Assets?
- Customer Q12. Does your local authority undertake customer satisfaction surveys into the condition of its highway network and if so how does it use this information to help drive service improvement?
- Q13. Does your local authority have a mechanism in place to gather customer feedback on its highway maintenance service and if so how does it use this information?
- Q14. How does your local authority ensure that customers are kept informed about their highway maintenance service?
- Benchmarking Q15. Does your local authority undertake benchmarking to drive improvement in its highway maintenance service?
- Q16. Does your local authority have a process in place to measure the ongoing cashable and non-cashable efficiencies that are being delivered in the highway maintenance service?
- Operational services Q17. Does your local authority have a mechanism in place to undertake a periodic review of its operational service delivery arrangements for the highway maintenance service?

Q18. Is your authority working in collaboration with your operational service provider and their supply chain in delivering the highway maintenance service or any component of it?

Q19. Has your local authority undertaken a Lean or equivalent transformational change management review of its highway maintenance service or any aspect of it?

Q20. Has your local authority produced a long term forward programme of capital maintenance works for all its highway infrastructure assets?

Q21. Is your local authority or your operational service provider working in collaboration in delivering the highway maintenance service or any component of it?

Q22. Is your local authority adopting a good practice approach in the way it procures external highway maintenance services?

Source: own summary based on DfT (2016).

Appendix 6: Interview questions for parish councils

First wave interview questions/prompts:

General parish questions

- Parish details: parish council, role of interviewee, no. of parish members
- Role of parish (role generally not highways related)
- How do you decide on the parish precept amount?
- What challenges do you face as a parish council?
- How would you describe your relationship with a) other parishes b) Leeds council c) local councillors and d) Highways England?

Communications questions

- How do you deal with planning applications?
- What feedback mechanisms do you use to share information from parish and obtain views of the public? Website, minutes, sub-groups, newsletter, Facebook
- Overall, what is the nature and frequency of complaints made by the public?

Highways specific questions

- In the past year, did the public raise highways at meetings? If yes, what aspects?
- What highways duties do you fulfil and to what extent?
- How would you describe how highways feature in parish meetings?
- To what extent, would you say highways are prominent or not at parish meetings?
- In the past year, did you undertake a community survey? Did it include highways?
- Is there anything else you want to mention related to highways or about the parish?

Second wave interview also asked: tell me about your local community; effectiveness of feedback mechanisms; and local plans in relation to highways.

Appendix 7: Local councils – powers

Table 35: Powers of local councils

Function	Power or duty
Allotments	Power to provide allotments. Duty to provide allotment gardens if demand unsatisfied.
Burials / churchyards	Power to acquire and maintain burial grounds and churchyards
Bus shelters and community transport	Power to provide and maintain bus shelters and to fund community transport scheme
Common land, village greens, open spaces and recreation	Power to manage and provide common pastures and to acquire land and manage it for open space, village greens, recreation and public walks
Community centres, public buildings and village halls	Power to provide and equip buildings for use of clubs having athletic, social or educational objectives and to provide buildings for public meetings and assemblies
Crime prevention	Power to spend money on various crime prevention measures
Education	Right to appoint school governors
Entertainment and arts	Provision of entertainment and support for the arts
Highways	Powers to provide and maintain footpaths, lighting, litter bins, roadside seats and shelters, parking spaces, cycle parks, traffic signs, trees and roadside verges. Power to complain to the district council in relation to protection of rights of way and roadside waste. Power to undertake traffic calming.
Information	Power to provide information

Lotteries	Power to promote
Land and investment	Power to acquire and dispose of land and participate in schemes of collective investment
Postal services	Power to subsidise additional postal and telecommunication services
Public conveniences	Power to provide
Town and country planning	Right to be notified of planning applications
War memorials	Power to maintain, repair and protect
Water supply	Power to utilise springs and streams

Source: excerpt from Newman (2005: 34-35). N.B. yellow highlight is own emphasis on highways and transport functions/powers that local councils have.