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The impacts of telecommuting in Dublin

Paul O'Keefe ^a, Brian Caulfield ^{a,*}, William Brazil ^a, Peter White ^b^a Department of Civil, Structural and Environmental Engineering, Trinity College Dublin, Ireland^b Faculty of Architecture and the Built Environment, University of Westminster, London NW1 5LS, UK

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ABSTRACT

Telecommuting has been perceived as an effective means of reducing commuter related trips, travel time and emissions. Previously, the lack of access to broadband Internet connection and teleconferencing software from home has acted as a barrier to telecommuting regularly or at all. However, with advances in information and communication technology in recent years telecommuting is becoming a viable option for employers and employees to undertake.

This paper examines the current trends of full day and part day telecommuting in the Greater Dublin Area (GDA), and attempts to ascertain the most influential drivers and constraints related to telecommuting. The research presented estimates of the environmental benefits from individuals that telecommute. Finally, this paper seeks to determine the magnitude of carbon emissions savings from individuals adopting telecommuting and provides a social cost of carbon saving value.

The survey results presented suggest that approximately 44% of the population of the GDA telecommute at least once a month. The findings also indicate that needing contact with colleagues is the most influential constraint to telecommuting, while greater flexibility and avoiding travelling in peak periods are the most important drivers in the propensity to telecommute. Finally, this study shows that there are substantial carbon reductions and social cost of carbon savings. Thus illustrating how telecommuting can be a viable and sustainable policy in the GDA or in other similar sized regions.

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1. Introduction

Telecommuting is essentially the elimination, or partial elimination, of a commute trip by working from home. Telecommuting has long since been seen as an effective way of reducing commuter-based emissions, travel times and congestion across the world. White et al. (2007) details the scope of the benefits that could be realised from an increase in telecommuting such as; reduced travel time, spreading the demand on public transport services and higher productivity from employees. In the past the lack of access to high speed Internet connections, teleconferencing software, or the necessary equipment to fulfil their job from home has stopped people from telecommuting. With high-speed broadband, personal laptops/computers, tablets and smartphones becoming more affordable and easily accessible, telecommuting is becoming a viable option for some employers and employees. However, in Ireland telecommuting hasn't reached its full potential. Hynes (2014, 2013) puts this down to a lack of political and policy in this field to promote this sustainable method of working.

This paper examines the patterns of telecommuting in the GDA and will investigate via analysis of census and travel survey data, what are the current patterns of telecommuting in the GDA. This research includes a survey of employees to discover if they telecommute on a regular basis and to ascertain what are the drivers and constraints of telecommuting in the GDA. This paper will estimate the emissions savings from individuals that telecommute, and aim to prove that telecommuting is a sustainable, long-term solution to reducing congestion and emissions in the GDA. This paper does not delve into the complex social dimensions of teleworking or the costs associated with working from home (heating, lighting etc) rather examines the benefits of this sustainable transport option using existing data sources and a survey conducted for this research.

2. Literature review

In Ireland, the largest source of information about telecommuting is gathered from the Census of Ireland, by the Central Statistics Office (CSO). The most recent census from 2011 gives a reasonable explanation of the current state of telecommuting in the GDA. According to the CSO, Dublin City contained a working population of 469,987 in

* Corresponding author.

E-mail address: brian.caulfield@tcd.ie (B. Caulfield).

2011. Within that figure, 117,764 commuted from outside the area to work in Dublin City. These commuters make up 76% of all workers with a daily commute into Dublin. Due to the high percentage of commuters into the City, travel time is approximately 50 min (for a one way trip), which is almost twice the national average of 26.6 min. The CSO also stated that 83,326 persons, in Dublin, indicated that they worked mainly at or from home in 2011.

A drawback of relying on the data collected in the census is that some workers may indicate that they telecommute, yet they may only do so for part of the day, thus this will not give an in-depth description of the true figures of those who telecommute. Furthermore, there are some workers who operate home based businesses or independent contractors who should probably not be classed as telecommuters (Walls, 2004).

There have been many studies researching the drivers and constraints of telecommuting. They all have some similar discoveries, with many stating that land use patterns, internet infrastructure, socio-demographic characteristics, access to high speed internet, the presence of children at home, public transport access and cost of travel and fuel can serve to influence rates of telecommuting (Caulfield, 2015; Choo, Mokhtarian, & Salomon, 2005; Fu, Andrew Kelly, Peter Clinch, & King, 2012).

A widely discussed benefit of telecommuting is the reduction in travel time, cost, congestion and emissions. Though these have had varying levels of success depending on the country the research has been implemented. Nelson, Safirova, and Walls (2007) ran a pilot telecommuting scheme across five US cities over two years and discovered that the emissions savings were relatively modest and the cost of continuing the research or carrying out further pilots was not worth the small emissions savings. Hynes (2013) finds that environmental concerns are one of the reasons, why people consider telecommuting. Choo et al. (2005) argues that more people choose to telecommute in opposition of fuel taxes and congestion charges, and that not only will telecommuting reduce the number of work related trips, but also non-work related trips for the commuter and their immediate family members.

The majority of people who telecommute tend to be higher and lower professionals. Also, these professionals tend to telecommute during traditional work hours (Alexander, Dijst, & Ettema, 2010; Caulfield, 2015). These professionals telecommute for different reasons. Mokhtarian, Bagley, and Salomon (1998) state that women for example are more likely to telecommute for family reasons, personal benefits and reduced stress levels, while men were less likely to telecommute due to lack of professional interaction, household distractions, and they view themselves as lacking discipline. Although gender, family and personal benefits are not always the case in choosing to telecommute. Caulfield and Ahern (2014) state that a lack of an improved public transport infrastructure to compete with an increasing and expanding commuter population has led to some people having no alternative but to either buy a car(s) to travel to work or to telecommute. Handy and Mokhtarian (1996) state that the future of telecommuting is in the hands of employers to provide the opportunity and the employees to take the opportunity. Although this may not be applicable for all types of businesses or people.

3. Methods and data

3.1. Census data

The first dataset used in this study is derived from the 2011 census of Ireland. This particular dataset is known as Place of Work, School or College – Census of Anonymised Records, more commonly known as POWSCAR (CSO, 2011). The POWSCAR dataset contains data pertaining to the status of almost 2.8 million people,

regarding whether or not they were in employment or education, and how they travelled to their place of work or education.

To further investigate what factors affect an individual's propensity to telecommute in the GDA, a number of other data sources were added to the POWSCAR dataset. This was required as the POWSCAR dataset does not contain information on many of the factors that some literature deemed significant in the uptake of telecommuting (White et al., 2007). These factors included deprivation and access to public transport.

Furthermore, individuals who were classed as agricultural workers or mobile workers were not examined in this study. This was due to the fact that the authors believed that these individuals could not alter the nature of their work or location(s) of work, and therefore would not be representative of the rest of the population of the GDA, and may skew results, such as travel times or travel distances. The first supplemental data added to the POWSCAR dataset was deprivation. This data uses an index developed by Haase and Pratschke (2012). This index measures affluence and deprivation of an area using a number of criteria, such as population change, age dependency ratio, lone parent ratio, education and unemployment rate. This study applied the index across the 690 electoral districts (this is one of the smallest resolution areas published in the Census) within the GDA. This study uses values ranging from -28 to 3 and over. The remaining set of supplemental data related to accessibility to public transport. The availability of bus and train are examined. The bus availability is measured in the number of stops per 1000 people. Whilst the availability of train is set as yes or no, if the train is available in an area. These variables are explained in Table 1.

3.2. Survey data

To address some of the shortcomings of the Census data a survey was conducted. The purpose of the survey was to obtain extra information on those that aren't defined as telecommuters in the Census, namely those that don't telecommute five days a week and do so less frequently. The survey was distributed through email to a number of organisations in the GDA, with the instruction to forward the survey to colleagues and interested parties. To increase the impact of the survey and reach a wider demographic, the survey was also distributed across many social network platforms. The survey ran from January to March 2015. The survey had 230 responses. As the survey was an online survey, and is subject to the bias that brings, but the survey was aimed those working in organisations with access to email and this method was deemed to be the most appropriate to gather responses. Given the data collection method and the low sample number, one should keep these facts in mind when interpreting the results presented.

3.3. Modelling approach

This section of the paper uses the data from the POWSCAR dataset and survey to model and determine what factors have an influence upon the propensity to telecommute in the GDA. To conduct statistical analysis of the POWSCAR and survey data, SPSS was used. The data from POWSCAR dataset and the survey was imported into SPSS, and the values were then defined in the software package for analysis.

As many of the variables to be examined had multiple outcomes, a multinomial logit regression model was used in this research to estimate these relationships. The models to be examined are done so on the basis of firstly, whether or not the individual telecommutes (POWSCAR data), and secondly, whether the individual telecommutes for a full day or part of the day, at least once a month or more often (survey data). The multinomial logit model takes the following functional form:

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