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Analysis of a Sustainable Travel Modal Share Study at the IT Sligo Campus

Dr Brian McCann

Lecturer, Department of Civil Engineering & Construction, School of Engineering & Design, and Principal Investigator, Centre for Environmental Research, Innovation and Sustainability (CERIS), Institute of Technology Sligo, Ireland.

Abstract

Research was carried out at IT Sligo to determine travel modes, and views and preferences of commuter stakeholders on sustainable transport provision. Findings were planned to provide inputs into development of a workplace travel plan and targeted reduction in car travel to the Institute, due to a planning application and associated transport development control conditions relating to a major Institute building project. It was also considered that existing parking demand was excessive and unsustainable thereby the plan provided an opportunity to influence travel modes positively.

Quantitative and qualitative survey methodologies were utilised in the initial stage of the study from November 2012 to February 2013. This included the identification of relevant stakeholder groups, the issuance of on-line questionnaires to determine modal choice and preferences of stakeholders, "live" interviews to gather real time journey characteristics, modal focus groups to determine concerns and attitudes, car parking accumulation surveys and comprehensive technical assessments of the Institute's transport infrastructure. An analysis of public transport services, usage and facilities was also performed.

As part of the Institute's implementation of a Sustainable Workplace Travel plan under the Smarter Travel Campus programme, monitoring of travel modes and attitudes was instigated during November/December 2014. This included an extended on-line stakeholder survey based on the 2012/13 study with additional questions relating to sustainable travel facilities to increase cycling, walking and public transport uptake, and a technical review of transport facilities and services.

It was found from the 2012/13 on-line (494 respondents/343 students) and 2012 live surveys (1346 interviewees) that the dominant travel mode to the Institute was by private car at 80% (60% for live survey), with car-sharing only occurring in 15% of trips (22% for live survey). It was determined that travel distance, convenience, public transport provision, and car sharing issues were the dominant factors affecting transport mode. Walking trips corresponded to a 27% modal share (on-line survey), compared with 36% ('live' survey). It was considered that a significant portion of walking commuters did not participate in the on-line survey. Inadequate lighting was also found to be a significant inhibitor to walking with security concerns highlighted. Parking availability influenced commuters' time of arrival negatively.

The use of public transport services (private/public bus) from the 2012/13 surveys was low (2% live survey; 5% on-line survey) with lack of facilities on campus and poorly connected, infrequent services the main hindrances identified. Cycling trip (2% live survey; 7% on-line survey) rates were low with obstacles such as weather, inadequate cycling routes, commuting distance, and poor Institute facilities identified.

The 2014 on-line questionnaire (210 respondents) findings strongly correlated with 2012/13 findings. Recent upgrades to Institute bus services had increased public transport bus mode share to 8%. Cycling modal share had also increased to 8% but awareness of new cyclist facilities and services was low amongst respondents. The 2014 survey also indicated that walking had also increased in popularity from 27% to 32% of respondents. It was concluded that insufficient awareness of new sustainable transport facilities had limited its potential.

1. Introduction

The Institute of Technology Sligo (IT Sligo) is a leading Irish third level educational institution, a key provider of quality education, innovation and economic and social development in the north-west and Border, Midland and Western (BMW) regions of Ireland.

It has developed and delivers higher educational programmes from Level 6 (National Certificate) through to Level 10 (PhD) on the National Framework of Qualifications, with an industry/business/community focus, and using both traditional campus and on-line virtual delivery modes. The 72-acre campus is located on the north periphery but within walking distance of Sligo town centre, and possesses extensive private and public transport links to the region and nationally, including a main railway terminus and bus depot. In recent years the Institute has been transformed with a combined €35 million capital investment, including new Technology and Science buildings, a refurbished student services building and a state-of-the-art library. It also includes modern sports facilities that are regularly utilised by local, regional, and national organisations, including major arts festivals and events (Figure 1) [1].

Key Code

- | | |
|---|-------------------------------------|
| A Library / Central Administration | H Student Services Centre |
| B MacMunn 1970 Building & Canteen | J Old BIC |
| C Languages & Marketing Centre | K Fine Art & Creative Design |
| D Business & Social Sciences | L Fine Art & Creative Design |
| E Technological Engineering & Computing Facility | M Applied Technology |
| F Technology Centre | P Knocknarea Arena |
| G Innovation Centre | |



Figure 1. IT Sligo Campus Plan with Main Buildings and Transport Access Indicated [1]

IT Sligo has approximately 5800 full-time and part-time students, 300 academic, and 200 technical, administrative and service staff, and a number of stakeholder organisations and businesses on campus, including the Innovation Centre, the Education Centre (for second level teacher training) and various retail and food outlets with associated staff. Sligo is largest town in Connacht with a population of 19,452 [2] and the campus is located on the north side of Sligo Town sharing a locality with various other destinations which attract significant volumes of commuter traffic. These include Sligo General Hospital, Ballinode Further Education College, Abbvie and Abbots Manufacturing Facilities, the Clarion Hotel and SOLAS Training Centre. In excess of 6000 people attend/work at IT Sligo which is a substantial proportion relative to the 20,000 resident population of Sligo Town. Additionally student accommodation is relatively plentiful and accessible, most of which within walking and cycling distance of the campus. In total 2,100 student bed spaces lie within the Sligo town boundaries [1].

During the inter-censal period of 2006-2011 a 30.9% increase in college commuters was recorded. Figure 2 shows that in 2011 22.5% of college students nationwide commuted by walking, over 4% travelled to college by cycling, and 22.5% used bus transport [3].

Fleming, Manton and Clifford [4] affirmed that travel to Higher Education campuses, as per national trends, had become increasingly unsustainable. Since 1986, travelling by car to college had almost tripled, while cycling had declined by 83%.

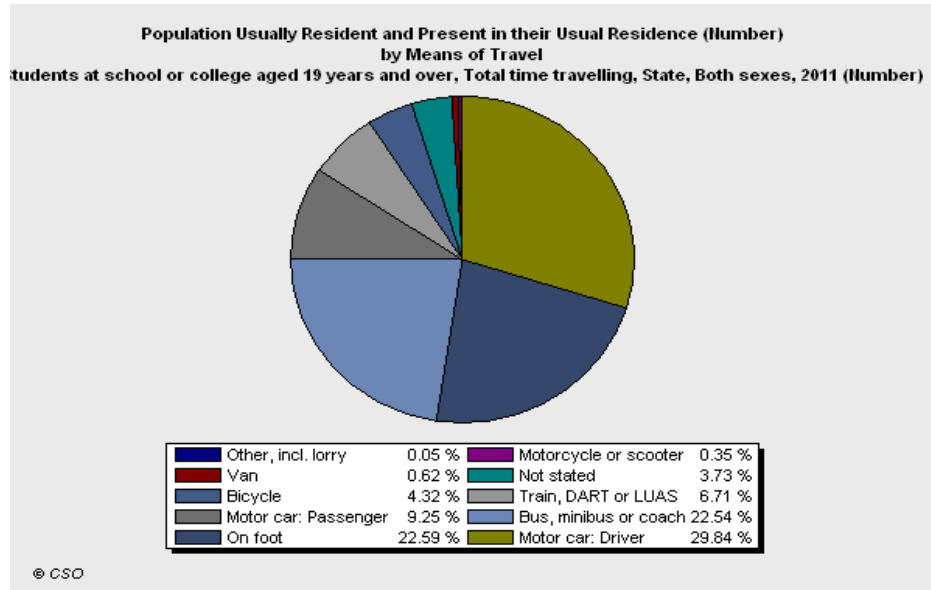


Figure 2. Proportion of Students Over 19 Commuting by Mode [3]

The National Travel Survey [5] conducted by the Central Statistics Office in the third quarter of 2014 produced detailed information on travel collected from 10,382 respondents over the age of 18 years. It was found that 4.5% of respondents travelled for educational purposes (down from 4.8% in 2012) and 25% were travelling to work (up from 23% in 2012). The mode of travel is illustrated in Table 1 and it is evident that active and sustainable modes (walking, cycling and public transport) are increasing but the dominant mode is still the private car with 74.4% of journeys being made as either driver or passenger.

Table 1. Percentage distribution of journeys by mode of travel, 2012, 2013 and 2014 [5]

Mode of travel	2012	2013	2014	Unweighted 2014 sample (journeys taken by persons aged ≥18 years)
	%	%	%	
Private car - driver	70.4	69.0	69.1	12,687
Private car - passenger	6.1	5.8	5.3	1,072
Walk	13.6	15.4	14.8	2,526
Bus	3.9	3.8	4.4	725
Cycle	1.2	1.3	1.6	245
Rail / DART / Luas	1.3	1.5	1.4	231
Taxi / hackney	0.8	0.9	0.9	155
Lorry / motorcycle / other	2.7	2.5	2.5	390
All modes of travel	100.0	100.0	100.0	18,031

IT Sligo is a recognised centre for environmental and sustainable development research and learning, and has been active in various “green” initiatives in recent years, including An Taisce Green Campus and NTA Smarter Travel Campus initiatives, aimed at reducing the environmental impact and improving the sustainability of campus activities and operations. Recent initiatives include student walking and staff cycle challenges for staff. IT Sligo were winners of the Best Workplace Award 2014 for larger Smarter Travel Workplaces [6].

2. Objectives and Methodology of Study

This study incorporates the findings from research project work conducted for both IT Sligo and Sligo Local Authorities over a three year period in three separate project packages, with

comparative studies being utilised to review progress of sustainable travel mode utilisation by commuters in Stage 1 and 3 of the study.

In September 2012 the author in conjunction with the IT Sligo Green Campus team and Estates Office devised a study involving surveys of Institute stakeholder travel preferences and modes, collection of data of current transport infrastructure, and formulation of recommendations for the development of a sustainable travel strategy, targets and plan for the IT Sligo campus. This travel strategy forms part of the Institute's commitment to An Taisce's Green Campus initiative, the requirements of the Smarter Travel Campus programme and local authority planning conditions relating to the construction of the 1970's B Block refurbishment and extension for the new McMunn Science Building and main canteen project (Figure 1). It was recommended that a Smarter Travel Workplace/Campus Travel Plan should be produced to reduce the level of car usage and promote sustainable travel modes to commuters. This approach is increasingly being utilised by local authorities so that national sustainable transport targets, e.g. 10% cycling by 2020, can be met and to encourage commuters to shift mode from the car to walking and cycling. Recently installed active and sustainable transport infrastructure and facilities delivered under the Active Travel Towns initiative are to the forefront of this policy [7].

The **first stage** of the research study was conducted with the aid of the final year class of BEng Hons in Civil Engineering students for a group Highway and Traffic Engineering module project and was completed in February 2013. The findings from this study were designed to be incorporated into the Institute's new sustainable travel strategy, provide data for the development of a Smarter Travel Action Plan (for the Smarter Travel Campus programme) and produce a technical assessment of the current campus transport infrastructure and travel patterns associated with commuting to/from the Institute.

A literature review of current guidelines and case studies of existing campus travel plans was initially conducted to provide a basis for the methodology and analysis developed for this study. This included a review of the Smarter Travel policy [8] and guidelines [9,10], current initiatives and resources for both workplace and campus programmes [6]. The University of Northampton Green Travel Plan 2008-2011 [11] was also used as a comparator and additional external resource for the development of the study methodology.

The **first part of Stage 1** of the study commenced in October 2012 and involved a review of the Institute's existing travel and transport infrastructure, facilities and modes of travel of its stakeholders. This involved assessment and reporting of findings of the following elements:

- Lighting provision for pedestrian and all road transport users
- Review of pedestrian facilities in relation to safety and efficiency on route to and on campus.
- Assessment of road user access involving a technical and safety evaluation of junctions and internal campus walking, cycling and road transport routes.
- Review of campus cycling facilities.
- Assessment of public transport facilities and services to travel stakeholders.
- Evaluation of car parking capacity on campus, the rate of parking accumulation and overall demand.

A number of survey instruments were utilised to assess the current use, condition and layout of the Institute's access and distribution routes for all modes of travel including sustainable forms such as cycling and walking. This included a review of all accesses, junctions and internal routes in conjunction with a review of lighting and other safety issues.

An assessment of the current parking, cycling, pedestrian, and public transport facilities was also carried out. Car and cycle parking capacity and location, and extent of public and private transport providers and services were also determined by in-situ data collection, live survey and on-line research of existing service provision. Maps of cycling and walking times were also produced to indicate the proximity of the campus to residences.

A parking accumulation survey determined the extent and nature of the existing car parking usage throughout a typical working day at the Institute, and the implementation of travel and attitudinal surveys of cyclists using the main cycle parking bays also contributed to the data on current users. A survey of the existing Bus Eireann and private bus operator services to the Institute also provided valuable data for analysis.

In the **second part** of the **first stage** of the study a survey of modes of transport currently adopted by students, staff, service providers, visitors to the campus and other stakeholders was undertaken from November to December 2012.

It was determined that the formulation of a comprehensive on-line survey questionnaire of stakeholders' current modes of travel to/from the Institute, attitudes to current transport infrastructure, parking, and sustainable modes of transport, would provide a key tool in developing a stakeholder-influenced sustainable travel strategy. This survey was developed by the research team following extensive consultation with stakeholders and current literature and was developed using the Google Docs (Sheets) © software for ease of access, analysis and reporting. It consisted of 32 questions designed to establish the stakeholder type, the current mode of transport to the Institute and the attitudes and opinions of stakeholders relating to sustainable travel modes and their potential use and requirements.

A "live" on campus interview travel survey of trip-makers was undertaken to complement the on-line survey by providing a real-time measure of the current use of car parking facilities and modes of travel to the Institute by stakeholders on a typical working day. A total of 1346 respondents completed the live travel interview over a pre-selected operational day and almost 500 stakeholders completed the on-line travel questionnaire over an extended period.

The surveys were promoted and respondents encouraged by various internal communications including email and by offering incentives such as minor prizes and explaining the benefits of the study aimed at improving travel services and facilities to stakeholders. The on-line survey was also promoted during the live travel survey.

The **third part** of the **first stage** involved the analysis of survey data and recommendations for sustainable travel measures for potential incorporation into an Institute Travel Plan.

The **second stage** of the study was conducted from October to December 2013 and involved a mid-term review and assessment of the cycling and walking strategy, sustainable transport policies and effectiveness of the infrastructure being developed by Sligo Local Authorities under the Department of Transport, Tourism and Sport Active Travel Town Scheme [7]. In June 2012 it was announced that Sligo Local Authorities was allocated just under €1m as funding for investment in cycling and walking infrastructure as part of the Active Travel Towns Scheme.

Findings from an IT Sligo project study on Sligo town travel modes conducted in 2012 were used as the base data for comparing the use of recently upgraded cycling and walking facilities by stakeholders, and recording their attitudes and opinions relating to sustainable active travel and public transport modes. The objective was to measure the uptake of walking and cycling travel modes relative to assigned targets, determine the dependence on private car travel for home to work and education journeys as Sligo town's sustainable travel facilities improve and citizens are informed of their benefits. This stage of the overall study was designed to achieve comparative context in relation to the uptake of sustainable and active travel modes in the wider Sligo town area and allow cycling and walking mode trends to be evaluated and compared with national targets and IT Sligo travel survey findings.

The aim was to assess the scheme deliverables within the Sligo active travel strategy based on the existing targets to 2016, existing survey data from the 2012 study, census data from 2011 and the new (2013) surveys following the implementation of the first stage of the scheme (June to November 2012) and the on-going implementation of measures. This assessment was based on targeted Household Travel Surveys and Workplace Travel Surveys designed to be comparable with the 2012 Sligo town study and centred on the recent measures implemented and proposed workplace travel plans for the major employers.

The study included a technical review of the provision, extent and usage of the cycling and walking infrastructure proposed and currently implemented by surveying and assessing the

design, condition and travel flow of the new walking and cycling lane network and comparing with guidelines including the National Cycle Manual [12].

An on-line workplace travel survey was devised and circulated to employees of some of the main local workplaces including IT Sligo, Sligo Local Authorities, Sligo Government Offices, Sligo General Hospital and Abbott Sligo. A household interview survey of Sligo town residents was conducted to assess attitudes to active travel, the current modes of travel being used and make comparisons with census data and Active Travel scheme targets.

The **third stage** of the study was launched in November 2014 and consisted of a review and update of the current and proposed Smarter Travel Campus methodologies, policies and strategy, a key element of the sustainable travel strategy for IT Sligo. This travel strategy forms part of the Institute's commitment to the National Transport Authority Smarter Travel Campus and Workplace scheme and from the local authority planning recommendations relating to the now operational McMunn Science Building and canteen.

The development of the strategy was underpinned by the findings of the first stage of this study. The purpose of the third stage was to review the findings of the first stage study and compare to the current and proposed Institute Smarter Travel Campus strategy. The improvements and methodologies implemented since the advent of Smarter Travel Campus initiatives, and facilities provided to encourage and facilitate sustainable travel for all stakeholders relating to the Institute were also assessed and an updated and extended on-line staff/student travel survey was also designed, circulated and results analysed.

The methodologies included on-line surveys and audits of facilities and improved transport infrastructure to collect data relevant to the review of the Institute's sustainable travel strategy including:

- The on-going development of a campus sustainable travel plan.
- Analysis of the Institute's current public transport, cycling, walking and parking infrastructure (compared with 2012/13 study).
- A survey of modes of transport currently adopted by students, staff, service providers, visitors to the campus and other stakeholders.
- Development of measures aimed at promoting the use of public transport services, walking and cycling modes of travel, in consultation with campus stakeholders.

This stage of the study was more limited in terms of the range of methodologies and survey duration when compared to the 2012/13 study due to project time constraints. A major objective was to provide trend data relating to active and sustainable transport mode utilisation for key IT Sligo stakeholder commuters over the period of plan and initiatives.

3. Results and Findings

For the Stage 1 review and analysis of the car parking infrastructure and usage at IT Sligo surveys of road access, parking location and capacity (Figure 3) and accumulation found that four routes provided access to six parking main areas with a very high rate of accumulation occurring in the morning peak (0800-0930) and maintenance of almost 100% density until mid-afternoon (Figure 4) resulting in high parking system stress. A snapshot live survey of regular cyclists at the main parking bay indicated 50% cycled every day, 58% cycled both to save money and to exercise, and 61.5% cited traffic safety as the main deterrent. A detailed evaluation of Institute cyclist facilities and travel times from locations with the Sligo town environs was produced and reported. It was found that cycling parking and changing facilities were considered inadequate and secure bike parking was not widespread throughout the campus and limited in capacity. A number of practical and proven improvements were identified that could be utilised to increase commuter cycling rates, including changing and showering facilities, more widespread and secure bike storage and improved cycle routes both internally and externally to the Institute. The pedestrian facility and route access surveys found that there were deficiencies in relation to safety, continuity of provision, capacity and condition in some locations, including at the two main route accesses and at external and internal road junctions. Inadequate lighting provision was detected along some key walking routes within the Institute grounds on route to main student

accommodation locations. A detailed survey further highlighted both specific luminance deficiencies, lack of provision, and overall lighting timing issues that may negatively influence walking uptake of regular commuters to IT Sligo. A number of practical recommendations were included in the reports to ensure improved safety and encourage walking travel mode, including the provision of additional crossing facilities on the Clarion Road on a key walking route to a number of student accommodation facilities.

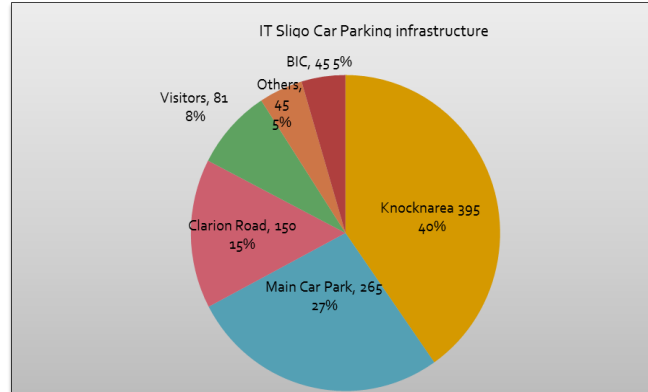


Figure 3. Parking Location and Capacity at IT Sligo

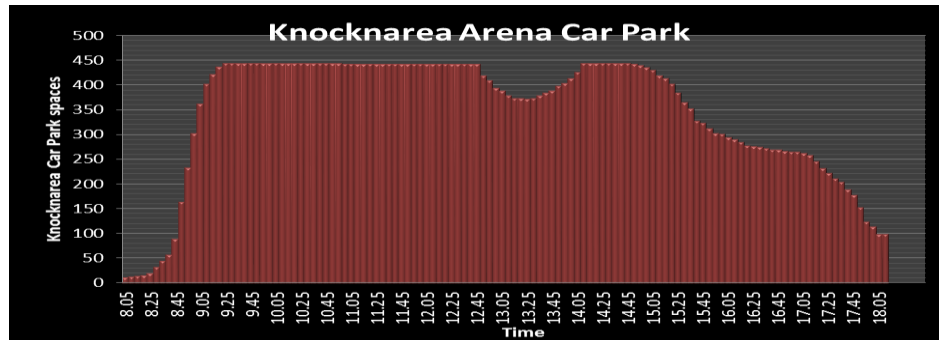


Figure 4. Parking Accumulation for Knocknarea Arena Car Park at IT Sligo.

A public and private bus transport facility assessment prior to the user surveys found that significant impedance to bus travel existed including infrequent public service provision, limited regular private bus services, poor service information provision, poor bus interchange facilities and provision, and high ticket costs were deemed to be likely detrimental factors.

A “live” campus interview travel survey of 1346 (estimated 30% of commuters) of arriving and departing commuters on a typical weekday found that the dominant travel mode was by private car with 60% of commuters using this mode, either as driver or passenger (Figure 5).

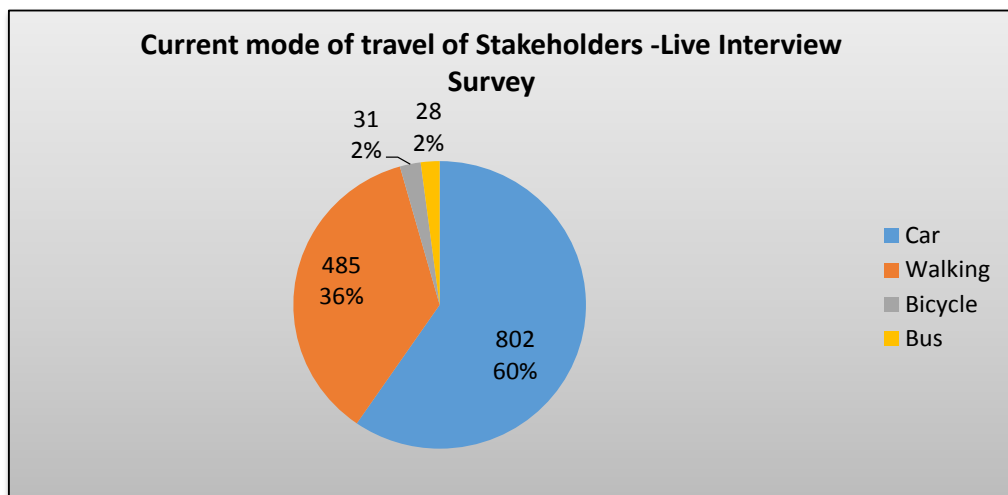


Figure 5. Mode of Travel of Stakeholders based on Live Travel Interview Survey.

82% of respondents were either full-time (77%) or part-time students (5%) with 18% being Institute staff. It was found that 22% of car commuters were sharing passengers. Walking trips equated to 36% of respondents with the majority being full-time students residing in adjacent student accommodation. The low level of cycling and bus transport (approximately 2% of respondents) reflects the findings of the infrastructure review, national data, and cyclist user group findings that significant impedances to these travel modes pertain. It was also determined that 64% of respondents commuted from Co Sligo locations, 10% from both Mayo and Donegal, and 7% from both Leitrim and Roscommon. It was also indicated by 57% of commuters that the “parking situation” affected their time of arrival at the Institute, and that parking availability influenced the time of home departure of 64% of respondents, with morning traffic congestion only influencing 17%. The dominant arrival time (Figure 6) was 0830-0900 (almost 45% of commuters) which reduced to 4% from 0900-0930. The dominant departure time was 1730-1800 for 35% of commuters, with another peak from 1630-1700 (22% departing).

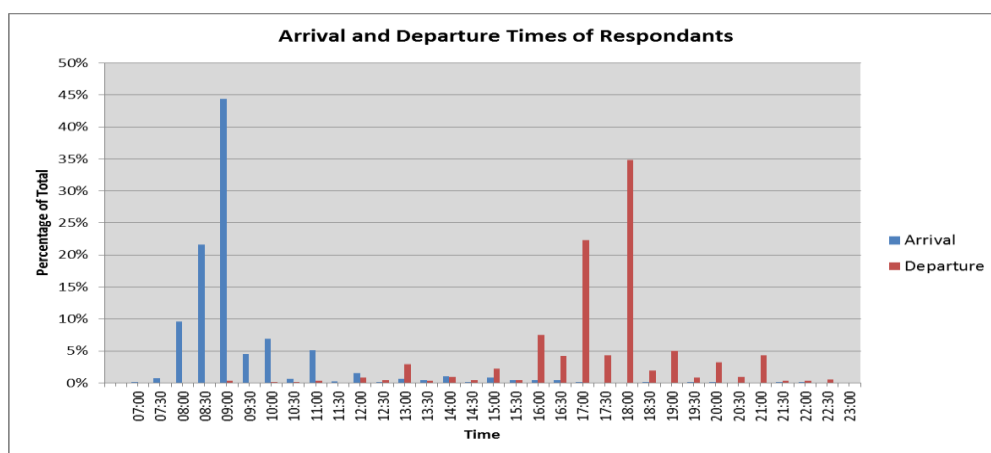


Figure 6. Arrival and Departure Times for Respondents of Live Interview Travel Survey.

The on-line questionnaire survey was distributed by email to all IT Sligo students, staff and other campus stakeholders on 27th November 2012. It was promoted by liaising with representatives of academic and services management, campus companies and organisations, and utilising staff and student portals, informing interviewees of the live travel survey so that a significant population was surveyed. The survey was available for an extended period to ensure a good response rate and a total of 494 questionnaires were completed by 10th December 2012. Responses to questions included a mix of selections from a range of possible answers (multiple responses allowed), ratings of current travel modes and facilities (based on the Likert Scale) and written responses. Figure 7 shows that of the 494 respondents 67% were full-time students and 29% staff with the remainder part-time students (2%) and other campus stakeholders (2%). More detailed information on work/study location, type of stakeholder and household were also determined.

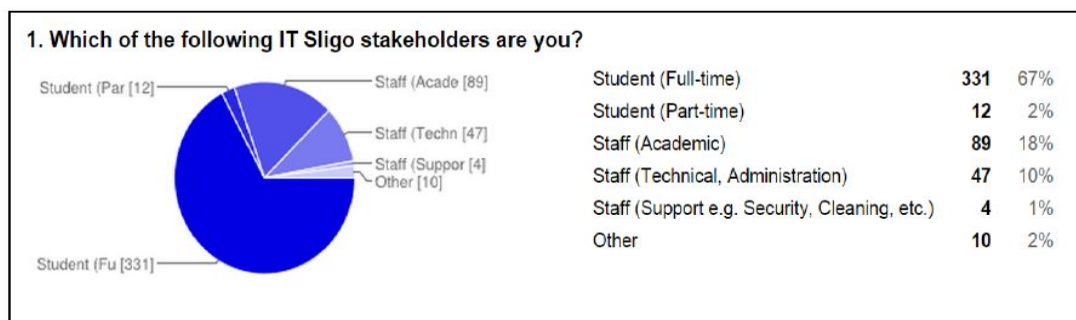


Figure 7. On-line Questionnaire 2012 Survey Stakeholder Type.

Question 6 findings (Figure 8) summate to 607 indications (more than one indication per respondent allowed), and the modes of travel were dominated by private car travel (80% of all respondents), either as driver (65%) or passenger (15%). Walking was used by 27% of

respondents, cycling by 7%, and bus transport by 5%. The survey was designed to allow for multiple responses so that stakeholders that the variable use of more than one travel mode depending on weather and personal circumstances, etc., could be recorded. This provides a more accurate indication of the varied and long-term travel habits of stakeholders than with “live” one day interview surveys.

Other questions related to the duration of travel, and the reasons for travelling by car. It was found that all respondents that answered the travel duration question (69%) indicated that their travel time to the Institute was greater than 10 minutes, with the median time being 10-20 minutes (29% of the total respondent sample). The reasons for using the car were selected from a list of possible responses and the most common responses included “quicker” (30%) and “more convenient (32%) than other modes”.

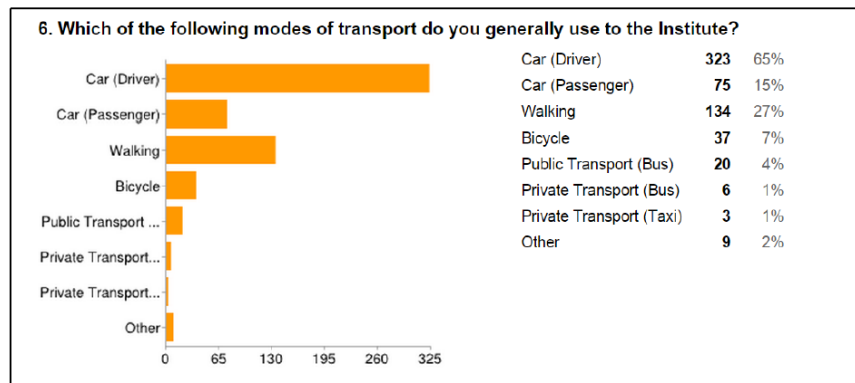


Figure 8. Mode of Transport Used for Journeys to the Institute – On-line Survey 2012

The “weather” and the “lack of reliability of other modes” were also strongly expressed. A question relating to why commuters don’t use the car provided responses including that they “live within walking and cycling distance from the Institute” (16%) and the “lack of car parking spaces” (12%) as the most popular. The reasons for not car sharing or pooling (considered a viable and more sustainable option for many college students who travel by car) it was found that “timing issues” (34%) and “no one else in your residence travels to the Institute” (33%) were the most popular responses. A number of questions on parking location and availability indicated that a number of commuters were parking off-campus (12% of all respondents) and that the arrival time of 67% of all respondents was influenced by lack of parking availability. It was also determined that 46% of respondents used the car as a travel mode every day.

The questionnaire then focused on the reasons for using/not using sustainable travel modes. It was found that approximately 10% of all respondents cycled to the Institute for “exercise”, the most popular answer, and 5% “to save money”. When asked why respondents didn’t cycle to college, the answers were varied and are shown in Figure 9, with “it’s too far” and “it takes too long” being the most common responses. The higher level of cycling (7%) from the on-line survey compared to the live survey (2%) suggests that many cycle infrequently, and this is reflected in responses on the frequency of usage, with the most popular being one day per week (7% of all respondents) and only 2% cycling to the Institute every day. When asked what facilities, services or variables would encourage respondents to cycle to the Institute more frequently the respective answers reflected many of the suggestions from the user group study carried out earlier (Figure 10). “It’s simply not an option for me” however was the most popular with 46% of all respondents, reflecting the relatively long distance travelled by many to the Institute. “Better weather and temperatures” was also a popular response (27%) but also an issue that is difficult to rectify. Other popular responses relating to changing facilities and secure parking bays offer feasible/practical solutions. The answers relating to walking travel questions followed a similar pattern. Many walk due to “living within walking distance” or for “exercise”, however the response “it’s too far” was very pronounced with 42% of all respondents providing this reason for not walking. “Poor weather” (16%) and “taking too long” (20%) reasons also reflect the long commuting distance incurred. Many short distance walking commuters (27%) did not participate in the survey, largely as they did not consider that they are using a transport mode. This is supported by the higher percentage of walking mode participants for the live interview survey (36%), when commuters were stopped randomly at college entrances.

18. If you don't cycle to the Institute what are the reasons for not doing so?

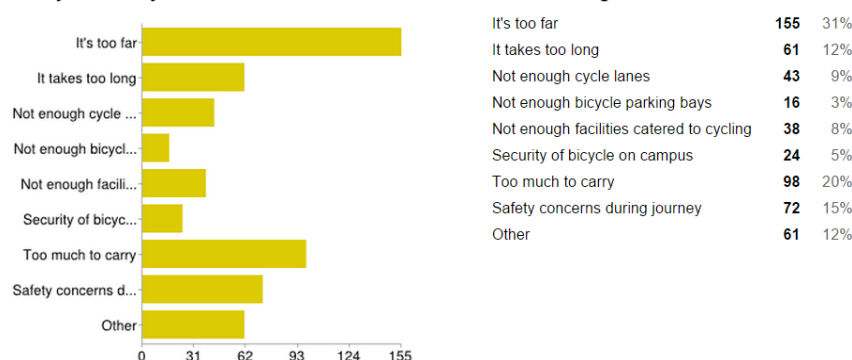


Figure 9. Reasons for not Cycling to the Institute- On-line Survey 2012.

19. Which of the following facilities, services and variables would encourage you to cycle to the Institute more frequently?

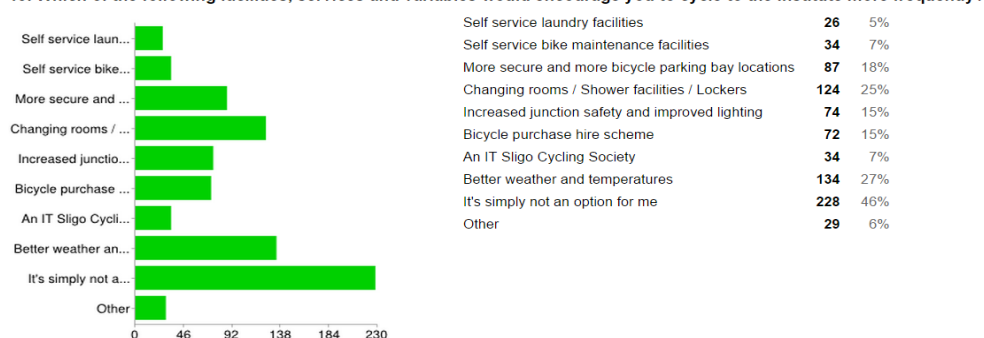


Figure 10. Facilities & Services that Encourage Commuters to Cycle – On-Line Survey 2012.

Other issues such as poor lighting, facilities, and security may have had a higher preferences if more walking respondents, often living closer to the Institute in student villages, had participated in the on-line survey. When asked what facilities would encourage respondents to walk, 50% indicated “it was not an option”, but 16% indicated “changing rooms/lockers/showers” and 11% “better junction safety and improved lighting” were potential solutions.

In relation to bus transport those that use this mode do so as “it’s the only mode of transport” available or it’s “the most convenient mode” (both 3%) but the reasons for not taking the bus were more illuminating. 29% of all respondents indicated that “there isn’t a bus stop/service near” and 18% indicated that “it takes too long”. These impedances to bus travel are reflected by the earlier study into the poor connections, infrequent services, and lack of facilities and travel information that pertained, which helped to frame the survey questions. Costs, reliability and lack of shelters also were relatively popular answers for this multi-response question (14%, 16% and 12% respectively). Increased frequency of (49%) and more extensive bus services (40%), and reduced fares (32%) were the most popular responses relating to encouraging more frequent use of bus services to the Institute.

Finally respondents were asked to rate the quality of transport services/facilities for each mode on a five point Likert scale (very poor to very good). For car travel 34% rated the existing facilities as average with 21% rating them good. For cycling 29% decided on an average rating and only 10% good, with 12% rating them poor. The walking facilities were rated average by 22% and good by 21% of all respondents. Bus services/facilities were rated average by 22% and poor by 17% of all participants with only 10% rating them as good.

The third part of the initial study involved the analysis of the travel survey and transport review data to determine recommendations for the following:

- Measures for promoting the use of public transport services, walking and cycling modes of travel, in consultation with campus and external stakeholders.

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- Conversion of IT Sligo campus buildings to provide for washing, drying and locker facilities for cyclists and other modes of sustainable and active travel.
 - The design and practical implementation of a car pooling and/or park and ride system.
 - The use of communications technology to promote sustainable forms of transport and provide information on public transport services.

Final reports included analysis of the current transport infrastructure, stakeholder surveys and recommendations for a sustainable travel strategy, policies and actions for the Institute. These recommendations included improvements in facilities and access for walking and cycling commuters, including campus changing and improved cycle parking, and more frequent, direct, and cheaper public bus services to and from the main suburban locations and the central bus depot. The public bus transport report included sample revised town service bus routes and frequencies to include more direct access to the Institute from transport hubs. The encouragement of car sharing and pooling by use of mobile apps and websites was also suggested, along with methods to limit parking using parking discs and encouraging pooling by allocating designated spaces for this type of commuter. Many of these measures were adopted by the Institute with safety improvements and the planning of new and improved cycling and bus transport facilities, including more secure parking, and changing/locker facilities on campus being provided as part of the Institute's commitment to the Smarter Travel Campus programme.

The second stage of the study in 2013 provided significant and extensive information to the local authorities for use as a mid-project report on the uptake of the Active Travel Town scheme, and also data on public transport attitudes and uptake using live interview household surveys. As a data input to the IT Sligo study it was found that the provision of cycle lanes adjacent to IT Sligo was variable and incomplete, and cycle lanes added subsequent to the design and construction of roads were of a less safe and uniform standard. This may have an adverse impact on the potential for cycling commuting. Further improvements, in particular the separate cycle/walking bridge crossing at N4 Hughes Bridge, should provide safer and more consistent cycle access. The results from the household surveys convey that only 49% of households contained someone working in Sligo. 75% of those travel by car to work, with 14% walking, 7% using public transport and the remaining 4% cycling. The modal split for those in school or college shows a more favourable trend towards sustainable travel. 46% travel by car, 28% walk, 21% use public transport and 4% cycle.

From the on-line workplace surveys 86.3% of respondents drive to work, with only 6% carpooling and 7.6% cycling to work. Some bias was thought to be present as those more likely to use sustainable transport would also be more likely to complete a survey regarding sustainable transport. This may also explain the similar cycling rate found with the on-line IT Sligo study, much higher than the live travel survey findings (2%). Also many of those who state they cycle to work do not do so every day, hence producing a higher ratio of cycling from on-line surveys, particularly those with multi-response questions. Over 55% of respondents indicated they would walk to work if they lived closer. Also 57% of respondents stated they would use public transport if routes were more direct. The main deterrents of bus use was the lack of direct, frequent services which was also found from the on-line surveys.

The third stage of the study was undertaken at the end of 2014, primarily as an opportunity to measure the changes in sustainable travel uptake since the introduction and improvements of various active and public transport facilities and services on and to the campus. The Institute launched new cycling/walking changing rooms, showers and locker facilities, a range of cycle parking and secure lockup facilities, a bike repair room and new cycle and pedestrian access upgrades to the campus during the intervening period from since the 2012/13 study. Many of the findings were taken in account when developing initiatives for the Smarter Travel Campus programme and to improve access to information for new and improved public bus services which were developed following the first stage study and in conjunction with Bus Eireann. The promotion and full launch of the cycling facilities took place in October 2014 but the new bus services and live information electronic notice boards plus new bus stop facility was not implemented prior to the study. The 2014 on-line stakeholder survey included all 32 questions of the 2012 survey and additional

questions designed to determine the level of awareness of the new facilities on campus. The sample size of participants was lower than the 2012 survey due to time constraints, with 210 respondents over a five day period, with similar numbers of each stakeholder type participating (68% full-time students). Comparative analysis of the findings from the replicated survey section revealed that close correlation was experienced between both surveys in relation to stakeholder travel methods, reasons for and opinions on travel modes to and from the institute. Car travel was still the dominant mode with 60% car drivers and 11% passengers, which indicates a reduction from 65% and 15% from the 2012 survey. Conversely the walking mode has increased from 27% to 32%, and cycling from 7% to 8%. Bus transport has increased from 5% to 8% in the 2014 survey which reflects the provision of new and improved services to the Institute. Shorter journey durations were reported with 27% of respondents travelling less than ten minutes. A number of questions' responses indicated that the parking issue had less effect on their trip-making timing and mode than in the past. A 3% increase in the numbers walking due to living close to the Institute was also found (23%). There was a strong shift from 32% to 42% in the number of participants stating that reduced public transport fares would increase their use of this option, a measure that has yet to be implemented. Other public transport issues experienced a decline reflecting the work done to improve bus regularity and frequency. There was also pronounced reduction in five day car usage from 46% to 40%, and an increase in five day walking from 18% to 23% but little increase in the percentage cycling and using the bus every day, with occasional use increasing slightly for both modes. There was also a significant increase in the rating for cycling facilities with a pronounced swing from average to good (from 10% to 16%), and modest increases in car, walking and bus modes with a very strong correlation with the 2012 survey results evident.

New questions for the 2014 on-line questionnaire included service ratings on the Likert scale, from 1-5 (with 1 being lowest and 5 the highest). The rating was bus timing awareness was low with 40% giving a 1 rating. Similarly bus route awareness was low (30% rated it 1) and advertising of routes was considered low with 38% rating it 1 and 19% giving a 2 rating. This was expected as there has been little promotion of new services and timetables on campus or using the Institute email, portals or website. New facilities have subsequently been installed adjacent to the main canteen displaying live bus times and service routes. Awareness of Green Campus improvements were mixed as indicated in Figure 11 but 56% of participants were not aware of the new improvements on campus. 48% of respondents indicated they would commute to the campus using more sustainable modes if facilities were better. This suggests that there is scope for increasing more sustainable travel in the future.

33. Are you aware of the recent upgrades to the facilities at I.T. Sligo as part of the Green-Campus Programme?

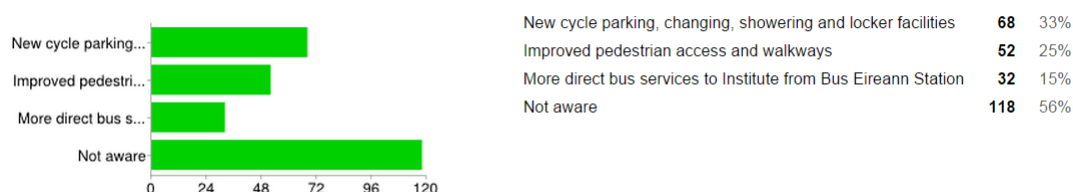


Figure 11. Awareness of Sustainable Transport Facility Upgrades at IT Sligo -2014 Survey.

Additionally a review of the recommendations of the 2012/13 study and of the new facilities installed and services utilised was undertaken as part of the 2014 research study. The lack of awareness of the new facilities which were centrally located and of high quality was considered poor, in particular for the new cycling that had recently been launched. Information on public transport services was also deficient and a revised and reduced student fare structure was required to increase usage of the new services was also considered an important factor.

4. Conclusions

The main conclusions relate to the continuing high reliance on the private car, with low car sharing evident, and its unsustainable impact on the Institute's and national transport infrastructure. The study also indicates that cycling and, in particular, public transport modes

used by students to commute to IT Sligo are lower than the national average [3]. Whilst improvements in active and sustainable travel mode facilities have been made as a result of Smarter Travel and Green Campus programme and the implementation of the findings of the 2012/13 study, it is evident that further promotion of campus facilities and service improvements are required, and targets need to be set to stimulate in an accelerated manner the uptake of sustainable travel modes to and from the Institute campus. The literature has indicated that unless Smarter Travel Workplace plans include targets and associated actions and are driven by senior management they tend to have limited success rates and often fail to have the desired impact [9]. It is also important that a team of stakeholders is utilised to develop a more sustainable and user-centred plan.

It can be concluded when designing a sustainable travel study suitable methodologies should measure the variation and combination of travel modes utilised by commuters. Live one-off interview surveys often only provide a snapshot of travel mode and, as was employed with the 2012/13 study, a range of survey instruments is required, with on-line questionnaires and group studies not only providing an opportunity for both quantitative and qualitative (attitudinal) data to be collected but also allowing respondents to indicate how and why their travel mode may vary throughout the week and seasonally. The focus of this study was to measure the current modes and attitudes to travel to/from the Institute for development of an Institute Smarter Travel Plan. It was determined that Higher Education campus commuting will involve varying travel times and modes according to individual timetables and the Academic Calendar. This imposes constraints on car sharing and pooling potential for many stakeholders, particularly with the scattered spatial demography of IT Sligo commuters as evidenced by the range of travel times to the Institute.

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