

**COMMUTER'S BEHAVIOUR TOWARDS THE USE OF MOBILITY SERVICES IN  
DRIVING SUSTAINABLE TRANSPORT IN GREATER AREA OF DUBLIN  
IRELAND**

**ADEMOLA MAYOWA OLATUNJI**

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**SUPERVISOR: CATHAL COLEMAN**

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## **DECLARATION**

‘I declare that this dissertation that I have submitted to Dublin Business School for the award of Masters of Business Administration (Information System) is the result of my own investigations, except otherwise stated, where it is clearly acknowledge by references. Furthermore, this work has not been submitted for another degree’.

Signed : Ademola Mayowa Olatunji

Student Number: 10536070

Date: 20<sup>th</sup> of August 2020

## **DEDICATION**

I dedicate this project work to God Almighty for his mercy, kindness, love and protection towards me, God you remain whom I will praise for the rest of my life (Amen).

## **ACKNOWLEDGEMENT**

Firstly, I want to express my gratitude to God for granting me good health and through his grace that sustained me through the course of this research work.

My gratitude goes to my supervisor Cathal Coleman for his encouragements, patience, crucial and guided criticism, and careful attention, which he took going through my manuscript to ensure a good result. I also want to express my appreciation to all my lecturers and the library staffs that assisted me throughout the period of this research.

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## ABSTRACT

*The study examined Commuter's Behaviour Towards the use of Mobility Services in Driving Sustainable Transport in Greater Area of Dublin Ireland. Survey research design was employed, and questionnaire was used as the research instrument. Moreover, stratified random sampling technique was used to select one hundred and fifty (150) respondents among commuters in Dublin Ireland and they were fully completed and returned. Simple percentage was employed to analyse the responses of the questionnaire while Pearson Moment Correlation was used to test the hypotheses formulated. However, it was found that there is positive significant effect of environmentally friendly options on sustainable public transportation in Dublin Ireland, there is negative significant effect of transportation cost on sustainable public transportation in Dublin Ireland and also that there is positive significant effect of less stressful transport system on sustainable public transportation in Dublin Ireland. It is therefore recommended that structure should be considered important as any entity interested in sustainable urban transportation system, because it will identify the issues and importance of each areas of sustainable transportation. Then will be able to learn about the objectives of that particular area of sustainable transportation, after that will also get an overview of some suggested actions and policy considerations to meet the objectives.*

**Keywords:** *Commuters, Travel Behaviour, Mobility Services, Sustainable Transportation, Dublin*

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## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 OVERVIEW**

The transport sector is one of the most significant sectors in achieving economic growth. One can argue that this sector is essential to both national and international economies. As Banister (2005) argued, the transport infrastructure's impact on prices, employment and economic growth at all levels makes effective transport service vital to exploiting the economic strength of a nation. Transport is not just fundamental for the economic development of mega-cities; it assumes a critical role in urban development. As it delivers access to education, recreation, employment, health care and other basic services to individuals (United Nations Economic and Social Commission, 2012). However, the unpleasantness of transport are congestion, urban pollution, noise, accidents, greenhouse and other negative externalities (Banister, 2005). It will be difficult to address climate change without pushing for sustainable transport. This is because transport accounts for 23% of global energy-related greenhouse gas (United Nations Advisory Group, 2016).

According to the United Nations, it was projected that by 2050, an extra billion individuals would be living in urban regions, expanding the urban portion of the total populace to 66%. Conversely, cities in developing and developed countries both experience congestion, pollution, demographic patterns and shifting centres which serve as imminent threats to lives and livelihoods (United Nations Advisory Group, 2016). Studies have shown that current transportations systems are not sustainable by a long shot (Gifford and Steg, 2005). As an outcome of this, the transportation sector is vigorously liable for public health in urban communities such as greenhouse gas emissions, noise and air pollution (United Nations Advisory Group, 2016).

Sustainable Transport does not have a universally established definition. According to Adrian and Leon Garcia (2018) transport is a key indicator used to determine if a city is sustainable or not. They further noted that it is as a system which allows individuals mobility needs to be met safely and consistently with ecosystem health and equity within generations. However, the United Nations Advisory Group on sustainable transport described sustainable transport as the provision of infrastructure and services for the mobility of people. In a manner that is safe, efficient, resilient, accessible and affordable, while minimising carbon and environmental impact for the advancing of social and economic development to benefit today and future generation (United Nations Advisory Group, 2016). The United Nations Advisory Group on sustainable transport definition was adapted to the 2030 Agenda for Sustainable Development. Sustainability as a concept has three main components, which are social, economic and environmental. Sustainable development ensures good stability between economic, social and environmental factors and capabilities of actual society without compromising the capacity of future generations to come (Adrián and León García, 2018). United nations noted that sustainable transport plays a vital role in achieving the 17 Sustainable development goals (SDG) set for 2030, due to the growing global trend and challenges of transport (United Nations Advisory Group, 2016).

In most developed countries, the levels of mobility and car ownership have increased substantially, with travel patterns being increasingly dependent on private car ownership and appear likely to continue to rise (Banister, 2005). In 2001 vehicle ownership in the European Union member had reached 629 vehicles per 1000 population, which amounts to 238 million vehicles for 378 million population. With road capacity reaching saturation, congestion would increase, especially in urban centres (Banister, 2005).

Private car ownership is beneficial to the individual user but poses a fundamental challenge due to its social cost and hindrance to sustainable transportation.

According to Banister (2005) in order for transport to conform to the principles of sustainable development, few key issues need to be addressed.

1. Mounting congestion in a lot of urban areas has been increasing.
2. National air quality standards recommended by the World Health Organization have been exceeded in many cities due to increasing air pollution.
3. Car dependency results in traffic domination in urban areas, with the use of space to facilitate the movements of motorist reduce the accessibility of others such as parked vehicles form obstacles for cyclists, pedestrian and those with disabilities.
4. According to the United Nation (2012), Transport is accountable for 23% of global energy-related CO<sub>2</sub> emission, so it would be beneficial in promoting sustainable transport in the fight against climate change. In 2014, four transport initiatives was considered in the UN Secretary-General's Climate Summit which was intensifying the use of electric vehicles, boosting the efficiency of rail transport and air travel, and enhancing public transport in cities around the world.

According to the National Travel Survey in 2016 conducted by the Central statistics office in Ireland. It was reported that Dubliners were less likely to use private cars for journeys as opposed to all regions in Ireland excluding Dublin, With 54% of journeys made by private cars in Dublin which is less than 74% of all regions excluding Dublin (Central Statistics Office, Ireland, 2016). With Ireland's growing population and increasing workforce, the present mode of transportation could cause congestion in Urban areas, particularly Dublin, with government and businesses pushing for more sustainable mobility.

## **1.2 JUSTIFICATION FOR RESEARCH**

Aligning with the National Transport Authority of Ireland Vision which is "To provide high quality, accessible, sustainable transport connecting people across Ireland" they published their statement of strategy for 2018 to 2020 stating one of their priority was to promote the use of more sustainable mode of transportation. This is with an objective of reducing carbon emission by promoting the switch from cars to public transport, walking and cycling which are more sustainable means of transportation (National Transport Authority, 2018).

Mobility Services could aid in the achievement of sustainable transport, and it could transition the way we use transportation. It also plays an important role in strategic planning for future Sustainability development. Mobility Service is a term which could be defined in various ways. The general theme being Mobility delivered as a service such as car-hailing, car-sharing, ridesharing, integrated public transport system, which is a switch from private car ownership for mobility (Chase, 2019). According to Sopjani et al. (2020), reducing private car commuting would be beneficial, as it is essential for the decarbonisation of cities.

## **1.3 RESEARCH OBJECTIVES**

1. To examine the significant effect of environmentally friendly options on sustainable public transportation in Dublin Ireland.
2. To explore the significant effect of transportation cost on sustainable public transportation in Dublin Ireland.
3. To ascertain the significant effect of less stressful transport system on sustainable public transportation in Dublin Ireland.

4. To investigate the significant effect of government policy on sustainable public transportation in Dublin Ireland.

#### **1.4 RESEARCH QUESTIONS**

1. Is there significant effect of environmentally friendly options on sustainable public transportation in Dublin Ireland?
2. How can cost of transportation have significant effect on sustainable public transportation in Dublin Ireland?
3. Is there significant effect of less stressful transport system on sustainable public transportation in Dublin Ireland?
4. What is the significant effect of government policy on sustainable public transportation in Dublin Ireland?

#### **1.5 RESEARCH HYPOTHESES**

**H<sub>01</sub>:** There is no significant effect of environmentally friendly options on sustainable public transportation in Dublin Ireland.

**H<sub>02</sub>:** There is no significant effect of transportation cost on sustainable public transportation in Dublin Ireland.

**H<sub>03</sub>:** There is no significant effect of less stressful transport system on sustainable public transportation in Dublin Ireland.

**H<sub>04</sub>:** There is no significant effect of government policy on sustainable public transportation in Dublin Ireland.

#### **1.6 DISSERTATION STRUCTURE**

The study is divided into five chapters, chapter one focuses on the overview information of the study, justification for the research, research objectives of the study, research questions, research hypotheses as well as the structure of the study. Indeed, chapter two

reviewed relevant literature by reputable scholars in the area of inquiry that looks at conceptualizing sustainable transport, travel behaviour, attitude towards sustainable transport, sustainable mobility, challenges and impact of sustainable mobility and the private versus public transport debate. Thus, chapter three focuses on the methodology aspect which reveals as follows; the introduction, research design, research philosophy, research approach, research strategy, time zone, data collection, quantitative data process, reliability and validity of research instrument, data sampling, methods of data analysis, research ethics and the limitations of the research while chapter four depicts the analysis, interpretations and discussion of findings of information gotten from the respondents through the administered questionnaires. Finally, chapter five will reveal the findings on analysis of data presented in the previous chapter. Indeed, the researcher after analysis and interpretation of questionnaire in the previous chapter, the findings and hereafter conclusion, recommendations and suggestions for further studies shall be stated.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

This literature review makes use of sources from online or bibliographic catalogue, books, journal, and peer-reviewed articles in journals. This literature review consists of logical introduction and presentation of relevant subjects – with investigations of new reasoning and issues identified with the primary research question which is: “Does the easy access to sustainable mobility services influence travelling behaviour of commuters in Ireland?”

It is imperative to note that there are themes that will be reviewed in line with exploring this literature. The themes which make up this research are proposed on the order of significance to the main and sub-research questions. This study builds upon existing literature on sustainable transport, travel behaviour and attitude toward sustainable transportation. Specifically, this study takes a look at existing knowledge of how sustainable mobility services (public transport, car-sharing service) influences the travel behaviour of commuter and acceptance toward sustainable transportation. As such, themes were developed considering what different researchers reviewed, expanded on, and constructed through the question framework of which the researcher wanted to analyse and answer.

**THEME 1:** Conceptualizing Sustainable Transport

**THEME 2:** Travel behaviour

**THEME 3:** Attitude Towards Sustainable Transport

**THEME 4:** Sustainable Mobility Service

**THEME 5:** The private versus public transport Debate

## 2.2 Conceptualizing Sustainable Transport

Sustainability can be described as a multifaceted field of research, with various supporting theories, that explores how societies can flourish without compromising the systems essential to the quality of life of future generation (Miller, 2014).

Sustainability is frequently looked at in terms of the theories of sustainable development.

Sustainable development or sustainability is summarised as social and economic development in the global setting ought to improve and not hurt the environment (Newman and Kenworthy, 1999). Newman and Kenworthy cited sustainability can be traced to the 1972 UN Conference on the Human Environment where 113 countries pledged to play a role in the cleaning up of the environment, actively participating and contributing to environmental issues on a worldwide scale. The concepts and ideas used to understand sustainability originate from various disciplines, including development studies, environmental sciences, ecology, economics, and engineering. Miller (2014) urged that the ideas from the triple bottom line framework can be used to understand sustainability. According to Pei *et al.* (2010), the triple bottom line framework, sustainability can be analysed in three different domains, namely ecological/environmental, social and economic.

The primary economic consideration under a triple bottom line framework is ensuring and guaranteeing development that advances economic pursuit in movement with the other two sustainability classes over time (Banister, 2005). Sustainable transportation includes the efficient and effective utilisation of resources, transformations in transportation structures and making healthier and more beneficial travel choices. These require sway from private vehicles, improved public awareness and participation and development of more environmentally friendly vehicles powered by renewable energy sources. This is due to the fact that in terms of energy consumption, transportation is regarded as the

fastest growing sector(Gray and Frost, 1998). Black proposes that a sustainable transport system is one that utilises the definition of Brundtland or simply said: "transport that satisfies the current transport and mobility needs without compromising the ability of future generations to meet those needs" (Black, 2010 page 10). According to Schiller, Bruun and Kenworthy(2010), a sustainable transport system plays a role in achieving the needs and aspirations of a community, while reducing its adverse effects on the environment and society as well as the financial cost associated with it (Schiller, Bruun and Kenworthy, 2010).

Bongardt *et al.* (2011), argued that sustainable transport definition should include specific highlight on economic, social, and environmental issues, due to the variety of negative impacts caused by transportation and its relevance to decision making (Bongardt *et al.*, 2011). According to Bongardt, Schmid, Cornie & Litman (2011) literature, it was stated that sustainable transport had no accepted single definition or step by step instructions on how to quantify it (Bongardt *et al.*, 2011 page 5). However, in the literature, a common definition referred to is that of the Center for Sustainable Transportation, which highlights three key elements of sustainable transport:

- Enables the basic access needs of people and societies to be met safely and in a way dependable with human and ecosystem health and does not compromise the future generations.
- Offers choices of transport mode are affordable, operates efficiently and sustains a vibrant economy.
- Minimises consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, limits emission and waste within the planet's ability to absorb them, minimises the use of land and the production of noise and reuses and recycles its components.

(The Center for Sustainable Transportation, 2005 pages 5 -7)

Banister, in his literature, outlines four aspects in which sustainable transportation paradigms is composed of namely:

- Actions to reduce the need to travel – substitution
- Support of transport modal shift – Transport policy measures
- Short trip lengths – land use planning measures
- Increased efficiency – technological innovation

(Banister, 2005 pages 1541-1542)

According to Schiller, Bruun & Kenworthy (2010) society at large – including economics, aspects of planning, citizen involvement and policy, not just technological progress are essential to creating sustainable transport (Schiller, Bruun and Kenworthy, 2010).

### **2.3 Travel behaviour**

The changing transportation priorities, objectives and goals and the current evolution of urban travel patterns necessitate that transport experts and researchers improve their proficiencies to plan and forecast the demand for travel. A theory is a useful tool in the observation of phenomena in scientific studies, notably when associated with human behaviour. Which also takes into account travel behaviour (Singleton, 2013). Theories from various fields such as psychology, geography and economics are instrumental in offering explanations for many transport-related and travel choices and observation (Singleton, 2013). A conceptual model of behaviour is often described by theories, which proposes the behaviour of interest and hypothetical relationships between conceptual factors that may explain or influence the behaviour (Handy, 2005)

#### **2.3.1 Economic Theories**

Economics as a field has contributed significantly to the development of theories, methods analysis, and tools to examine travel behaviour, especially in the sphere of

estimating, identifying, and applying travel demand forecasting models. In the transportation domain the most common econometric theory used is the theory of random utility maximisation. Daniel McFadden shared the 2000 Nobel prize in Economics for his role in popularising and adapting the theory of random utility maximisation to the analysis of discrete choice such as travel mode choice (Singleton, 2013).

### **Random Utility Maximization (RUM) Theory**

The theory Random utility maximisation (RUM) assumes that, from a set of choice with discrete alternatives, the best alternative is always selected by the decision-maker, with him or her selecting the option with the highest utility (a scalar measure of value). According to the theory for every alternative, if every single attribute taken into consideration by the decision-maker were known to the analyst, a Random utility maximisation based discrete choice model could be developed and used to predict with certainty every choice. When predicting distinct choices, the theory of Random utility maximisation provides a mathematical method to account for these random utility components. Random utility maximisation assumes a reasoned decision-making process and a rational decision-maker. This implies the decision-maker will consistently pick the best alternative given the information available to them at that point.

Furthermore, given the precise equivalent conditions, the decision-maker will consistently settle on a similar decision. The early applications of Random utility maximisation to travel demand planning and modelling was in San Francisco and Pittsburgh regions (Domencich & McFadden, 1996 page 41). Mode choice, destination choice, trip frequency and time-of-day choice where discrete choice models analysed among the many travel decisions. Various details of basic discrete choice models that is contained within random utility maximisation theory have been proposed and used to model travel demand and to analyse travel behaviour(Manski, 1977) .

### 2.3.2 Geography Theories

Viewpoints from the field of geography in the 1970s, strongly influenced and impacted the conceptualisations of travel behaviour and particularly methods of forecasting and analysing the demand for travel (Van Acker, Van Wee and Witlox, 2010). Specifically, a shift of focus from predicting and measuring travel patterns to exploring activity patterns that generate travel demand has shown to be transformative.

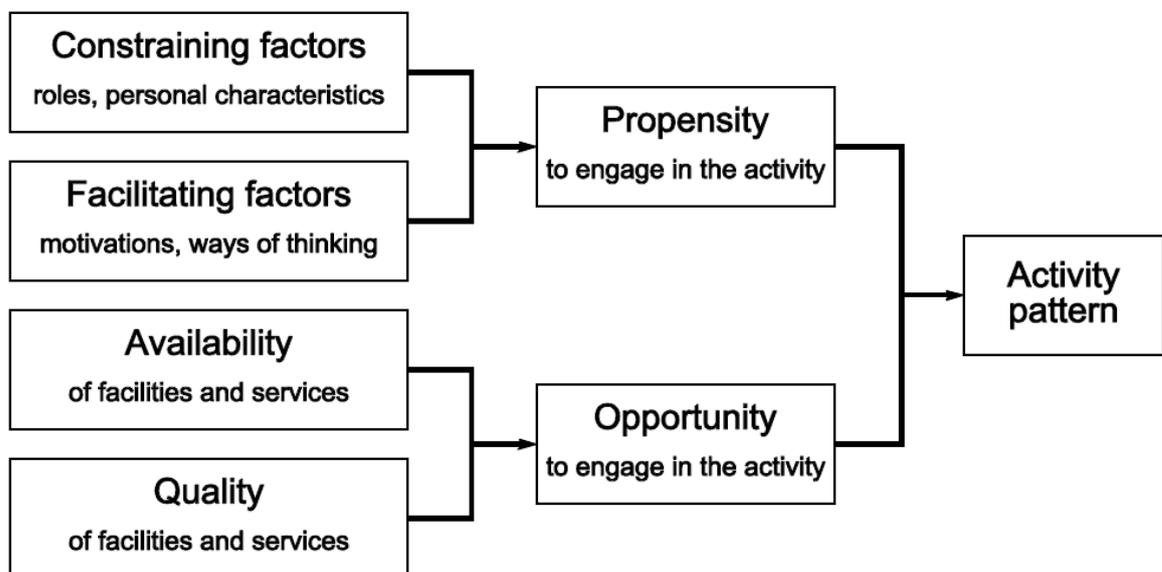
The influences of Hägerstrand's time–space prism to portray spatial and temporal constraints on individual behaviour (Hägerstrand, 1970) furthermore, Chapin's framework to describe individual activity patterns (Chapin, 1974) were fundamental to the development of the modern age of activity-based travel demand forecasting models. Through Hagerstrand seminal introduction of the time-space prism, his contribution to travel and activity behaviour theory was noted (Hägerstrand, 1970). Notwithstanding recommending that the regional science and geography fields ought to explain cumulative patterns through considering individual behaviour, Hägerstrand suggested that individuals' behaviour could be depicted in both time and space, confined by three sorts of constraints: coupling, capability, and authority constraint. Chapin's study contributed to travel behaviour through his emphasis on and analysis of activities and activity patterns (Chapin, 1975). To rationalise individual behaviour, Chapin proposed three components: motivation (satisfying a need or want), choice (choosing between feasible and perceived options), and outcome (action). Propensity is influenced not just by constraining factors (like Hägerstrand), including individual characteristics and role, yet in addition by empowering or encouraging factors, including motivation and perspectives. For instance, an individual who is motivated to walk for exercise yet constrained by her schedule at

work may have a lower propensity to walk. Chapin's model recommends that socioeconomic attributes, as individual constraints on propensity, impact activity patterns and in this way travel. Opportunity is influenced by both the accessibility and the quality of services and facilities. For instance, an individual may have a propensity to commute by bicycle; however, without safe bicycle facilities along his way, he has a low prospect of cycling. Along these lines, Chapin (1975) proposed that activity patterns (and basic individual behaviours) are the consequence of both demand-(propensity) and supply-(opportunity) reactions. Chapin foreshadowed a key segment of activity-base models (the decision of everyday activity pattern), in his analyses of activity patterns in the Washington, DC, region (Chapin, 1975 page 261).

For the rationales of the theory described in this study, Chapin's most significant contributions are:

1. his discoveries that individual attributes like socioeconomic factors and demographic impact the feasibility of activities and travel through constraints.
2. That environmental factors about the accessibility and nature of transportation services and facilities likewise impact activities and travel.

(Chapin, 1975 pages 261-264)



## **Fig 1. Activity Pattern Model**

**(Chapin, 1975)**

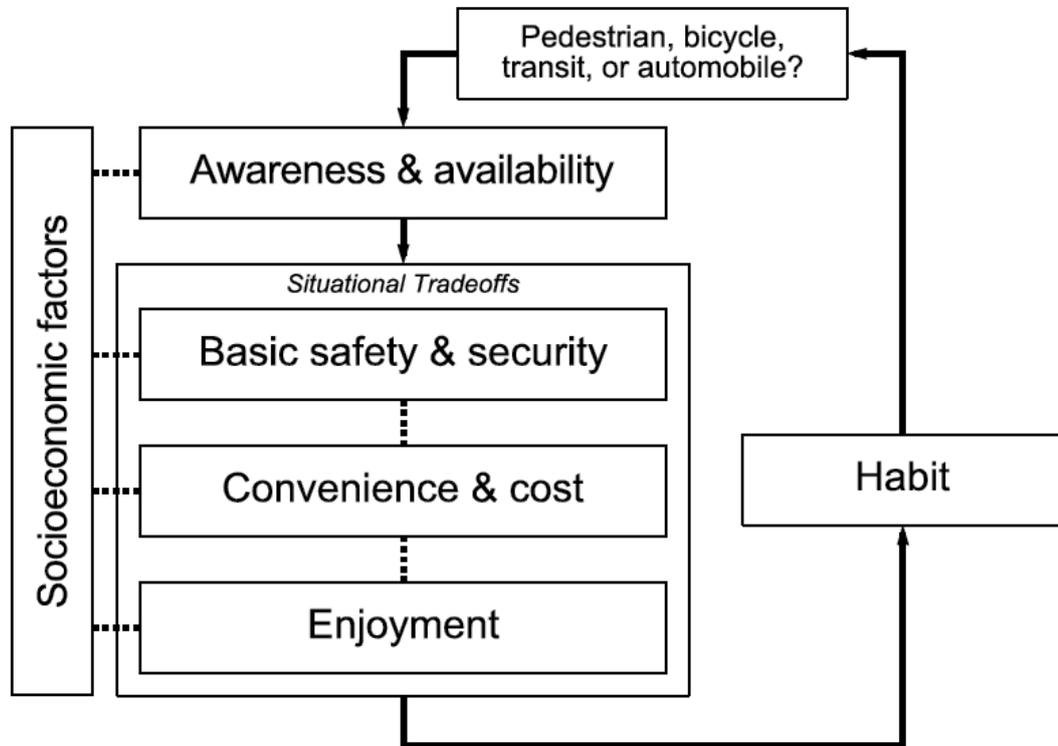
### **2.3.3 Theory of planned behaviour**

As of now, the Theory of Planned Behaviour is the most widely recognised theoretical framework applied to predict a person's intention to take part in a conscious behaviour (Godin and Kok, 1996). The Theory of Planned Behaviour hypothesises that factors outside of the control of the individual also influence intentions and in this way behaviours; the behavioural intention is directly affected by behavioural attitudes, subjective norms with respect to the conduct, and (presently) perceived behavioural control, the amount one wants to control the intended behavioural action. This theory argues that people's attitudes and convictions may not legitimately decide travel behaviour but indirectly by means of behavioural intention (Armitage and Conner, 2001). A series of studies effectively applied the theory of planned behaviour directly to travel mode decision interventions and analyses. The authors discovered significant impacts of attitudes, perceived behavioural control, and subjective norms on expectations, and of intentions on behaviour, supporting the Theory of Planned Behaviour hypothesis that intention facilitates these associations with behaviour (Bamberg, Ajzen and Schmidt, 2003 page 185).

### **2.3.4 Theory of Routine Mode Choice Decisions**

According to Schneider (2013), The theory of routine mode choice decisions depicts how individuals may pick a travel mode for routine, non-work or school exercises, for example, shopping and other tasks (Schneider, 2013). Established upon travel behaviour research on the variables that impact walking and bicycling, it was developed with the

help of subjective top to bottom interviews of shoppers travelling in the San Francisco Bay Area of California (Schneider, 2013).



**Fig 2. Theory of Routine Mode choice decision**  
(Schneider, 2013)

Schneider's theory of routine mode choice decisions proposes a five-step successive choice procedure, as appeared in the diagram above. The initial step, availability, and awareness decide the travel modes that are conceivable to be picked and for which rational trade-offs are therefore made. Notwithstanding, factors like vehicle availability, individuals must be aware of the modal choice to consider it. In the second step, commuters consider the safety that a given mode will give from car accidents and the security that it may afford from crime. In the third step, individuals likewise trade-off the convenience and cost of every mode, including money, time, and effort. The accessibility

of activity places and the cost of parking were the two of the most compelling factors determining cycling and walking . In the fourth step – enjoyment – individual, global, and social benefits may make specific travel modes more appealing. For instance, cycling and walking may deliver health benefits from work out. The fifth step, habit, let prior decisions impact future choices through input and conclusion of the decision loop. Socioeconomic elements play an indirect role by influencing how people assess every one of the initial four steps (Schneider, 2011 page ).

#### **2.4 Attitude Towards Sustainable Transport**

There are works of literature which analysed the psychology, behaviour, attitudes and approaches taken toward sustainable transport and transport. Potter (2007) report explored the impact of combinations of transport technologies and change in travel behaviour in reducing greenhouse gas emission towards sustainable levels. The study provides tools in exploring transport's sustainability challenges. The study notes that a substantial shift from personal transport to public transport cannot in itself achieve the sustainability goals. Still, a combination of demand management tackling trip length, technical development in private vehicles, trip generation and transport sharing could bring improvements (Potter, 2007).

Steg (Steg, 2007) examined potential contributions of psychologists to sustainable transportation. The study contended that in order to achieve sustainable transportation, behavioural changes of individual car users are needed. The study argued that various type of behavioural changes would be needed to achieve sustainable transport. Ranging from changes in transport mode choice, driving style, changes in location choice for car owners, stating these changes are associated with different behavioural cost. The study stated that transport policies would be more effective if they target major antecedents of behaviours. The paper elaborates on policy strategies that may be employed to achieve

sustainable transportation by changing car use. The study advised car use should be made less attractive employing push measures to force drivers to reconsider their travel behaviour.

According to Eriksson *et al.* (2008), push and pull are often two terms used to describe policy formulation, mostly in the conversation of measures to coordinate and impact travel behaviour. The push measures are termed as a measure which aims to give directions or point individuals away from and turn certain behaviour - on account of auto transport; research has discovered that these kinds of policies might be less positive for the public (Eriksson, Garvill and Annika, 2008). Studies which attempt to understand the public acceptability and fairness of push measures were undertaken by Eriksson *et al.* (2008) as well as Schuitema *et al.* (2013). Pull measures, conversely, are measures proposed to draw in individuals away from less ideal behaviour and towards an alternative behaviour and might be viewed as more reasonable and fair contrasted with push measures (Pridmore and Miola, 2011). Improving cycling and public transit infrastructure are examples of Pull measures. According to Eriksson *et al.* (2008) study, the acceptability of various transport policy measures was investigated. In order to break down elements significant for the acceptability, the study proposed a model where the policy specific beliefs (perceived effectiveness and perceived fairness) combines with value-belief-norm theory were used to predict acceptability (Eriksson, Garvill and Annika, 2008).

Moreover, the study analysed whether personal norm or problem awareness was more significant for acceptability. Eriksson *et al.* (2008) study result indicated that the push measures were seen to be somewhat unfair, ineffective, and unacceptable, while the pull measures were seen to be fair, effective, and acceptable. Furthermore, effectiveness and perceived fairness were seen as particularly significant for acceptability.

Beirao and Sarsfield's ( 2007) paper analysed travellers attitudes towards transport and explored perceptions of public transport quality. The study highlighted several factors that influence the choice of transport such as lifestyle and individual characteristics, type of journey and perceived service performance of each mode of transport. The study suggests the need for considering travel behaviours and attitude to create a segmentation of users. Furthermore, the study suggested that policies which aim to influence car usage should be targeted at the users' market segment most motivated to change and willing to reduce the frequency of car use.

Waqas, Ahmad and Yuming (2018) study aimed to delve into the consumer attitude towards sustainable transport, and by applying a norm activation model (NAM) to investigate the consumers' willingness to switch to an environmentally friendly option such as public green transport and cycling. Furthermore, the study investigated the role of different predictors (traffic problem awareness, sustainable transport benefit awareness, symbolic motives of using a car and government policies) influencing resident's acceptability to sustainable transportation alternatives with moderating role of self-enhancement and self-transcendence and mediating role of environmental concern. The result of the study conducted in four metropolitan cities in China discovered that acceptability towards sustainable transportation has a negative association with symbolic motives of using a car. In contrast, sustainable transport benefits and traffic awareness contributed positively towards acceptability of sustainable transportation. The environmental concerns mediating effect was demonstrated, which expand the role of norm activation model(NAM) in the study. Waqas, Ahmad and Yuming (2018) study highlighted the potential implication for transportation, urban planning in China also the necessary fundamental measures to advance sustainable transportation behaviour in Chinese cities (Waqas, Ahmad and Yuming, 2018).

Xia *et al.* (2017) researched the connection between road users' travel behaviour and attitudes, also investigated the acceptability of traffic measures for sustainable transport and examined indicators of intentions to reduce car use. The study argued that both traffic problem awareness and sustainable transport benefits awareness factors were positively associated with sustainable transport acceptance. Furthermore, the study highlighted public transport negative emotion, car use comfort and cycling safety concerns were also considered and related to private car use. The findings of (Xia *et al.*, 2017) study shows the significance of increasing public awareness with traffic problem and perceived advantages of sustainable transport as a likely approach to reduce car use (Xia *et al.*, 2017).

## **2.5 Sustainable Mobility Service**

Litman (2003) characterises mobility as measuring the movement of people and goods and recommends that a mobility concept is grounded in the possibility that any increase in travel is beneficial to society. The study also defined accessibility as a way to facilitate people to reach opportunities (goods, service, or destinations). Mobility Service is a term which could be defined in various ways. The general theme being Mobility delivered as a service such as car-hailing, car-sharing, ridesharing, integrated public transport system, etc., which is a switch from private car ownership for mobility (Chase, 2019). According to Sopjani *et al.* (2020), reducing private car commuting would be beneficial, stating it is essential for the decarbonisation of cities. Sopjani *et al.* (2020) study highlighted the increasing importance of mobility services (such as public transport, bike sharing, car sharing and carpooling) in providing an alternative to cars for daily commuting. The study also proposed a transition of user behaviours toward more sustainable mobility practices. (Lennert *et al.*, 2017) report challenges in decarbonising transport with climate change mitigation challenges for Europe identifying emerging and innovative mobility

systems in implementing a sustainable transformational path, the report aimed at assessing innovations and technologies particularly in smart mobility focusing on their urban applications identifying priorities and recommendations for European cities. The study also observed changes in user behaviours and lifestyle of younger generation for opting for shared mobility and reducing the use of private vehicle for mobility. Stating the adoption of digitalisation of transport users through smart phone, social media, web and mobile application which if such trend persist in user's behaviour it could be a huge factor in decarbonisation and a much more sustainable transportation option.

### **2.5.1 Challenges of Sustainable Mobility Service**

In the space of just a few decades, urban areas across the world, in both developed and developing countries have become increasingly automobile-dominated and less sustainable. In developing countries in particular, cities have experienced a rapid growth in transport-related challenges, including pollution, congestion, accidents, public transport decline, environmental degradation, climate change, energy depletion, visual intrusion, and lack of accessibility for the urban poor. In more developed countries, particularly in Northern Europe, some cities have witnessed a trend of reclaiming urban space from the automobile and prohibiting cars from major parts of downtown areas and/or confining them in other ways (Hiscock, Macintyre, Kearns & Ellaway, 2012).

Today, these places are often considered as leading examples of sustainable urban development, as cities across the world strive to meet urban sustainability standards by improving public transport, encouraging non-motorized modes, creating pedestrian zones, limiting the use of private cars, and otherwise trying to undo the transformation of cities caused by automobile dominance. Concepts of automobile restraint that were unthinkable just a few decades ago are now being considered or even adopted in many urban areas

around the globe, both north and south, with the encouragement and support of major international organizations (Howley, Dennehy & O'Gallachóir, 2019).

Effective road-based public transport is central to economic growth of developing cities. For the majority of residents, road-based public transport (bus and paratransit) is the only means to access employment, education, and public services. In medium and large developing cities, such destinations are beyond viable walking and cycling distances while vast numbers of individuals have limited access to automobiles. Unfortunately, the current state of road-based public transport services in many developing cities does not serve the mobility needs of the population adequately (Howley, Dennehy & O'Gallachóir, 2019). Formal bus services are often unreliable, inconvenient, uncomfortable, or even dangerous. Informal paratransit services, while providing benefits including on-demand mobility for the transit-dependent, jobs for low-skilled workers, and service coverage in areas devoid of formal transit supply, carry major costs, such as increased traffic congestion, air and noise pollution, traffic accidents, and even violence among route cartels (Keegan & O'Mahony, 2013).

Berger *et al.* (2014) study introduced four challenges towards the current arrangement of mobility. The challenges described in the study are, the systematic and complex landscape of mobility patterns; the absence of consensus about the exact idea of a more sustainable system of mobility, repeating more extensive divisions among strong and weak understandings of sustainability. Furthermore, the dominance of the car which give rise to vested interests and path dependencies; and the frequently ignored fact that mobility needs are very unique for various parts of the populace and in various location. Berger *et al.* (2014) paper also discussed the problems of sustainable mobility endeavours and attempts in practice such as the difficulties to maintaining moderately sustainable travel behaviour among young adults; and verbosely confined explanation of policy

choices and development directions that don't strengthen dependence on the car. The study also discussed three paths essential for mobility research, arguing more consideration regarding the social element of sustainable mobility; a need to connect all the more methodically with the power dimension of mobility choices and mobility patterns; and a better comprehension of how abstract notions of sustainable mobility are embraced in local settings and shaped by local residents (Berger *et al.*, 2014).

May (2013) provided a review of patterns popular for urban transport, and considered their implications for the accomplishment of a lot of urban transport policy objectives, and sums up the primary issues which are likely to emerge. In addition, the study also reviews the hindrances to the design and implementation of urban transport policy and It reviews the hindrances to the plan and execution of urban transport policy and summarises guidance on ways of overcoming these hindrances (May, 2013). According to Browne, Caulfield and O'Mahony, (2011) the economic geography in Ireland has changed due to the population and economic trends over the last decade, which gave rise to several adverse trends, including car-dominated transport system, urban sprawl and longer commuting distance. Unavailability of public transport or cycling facilities or limited network coverage has been seen as the most significant barrier to commuter modal shift particularly for residents in low-density urban areas and rural communities(Steer Davies Gleave and Fitzpatrick Associate, 2006). A few studies have pointed out that individuals see public transport to be inferior compared to private transport in terms of prestige, autonomy, and protection (Browne, Caulfield and O'Mahony, 2011). Yes, private luxury and public squalor Issues of safety can be another significant barrier to expanding the modal share of walking and cycling. There is a perception that walking and cycling are potentially hazardous and unsafe due to increasing traffic volumes and aggressive driving behaviour (Bauman *et al.*, 2008;

Gatersleben and Haddad, 2010; Sustrans and National Transport Authority, 2019). Normal travel time, by bus specifically, might be higher than a comparable car journey, especially where there is an excessive number of stops on a route or where bus route is congested. Respondents in the local authority survey indicated that local public transport services were inefficient (Fitzpatrick Associate, Steer Davies Gleave and O'Reilly Consultants, 2004).

## **2.6 The private versus public transport Debate**

The influence of socio-demographic effects on travel behaviour is well-established. Researchers often rely on car ownership levels, as a key indicator influencing travel behaviour patterns, as undoubtedly households with higher levels of car ownership tend towards higher shares of car use (O'Gallachóir, Howley, Cunningham & Bazilian, 2019). However, as noted, this type of analysis does not necessarily elucidate whether there are viable alternative options in place (for example, distances to facilities that are suitable for walking and cycling and high-quality public transport). In a case in which there are available alternatives, it can be argued that subjective factors may influence the persistence of high levels of car use. Clearly, if there are no alternatives, it is more challenging to provide viable policy solutions to reduce car use. It is in those areas, where there are alternatives, but car use is still high, that there is opportunity to look at policies to encourage alternative behaviours (O'Gallachóir, Howley, Cunningham & Bazilian, 2019).

Transportation interconnects and intersects with several parts of society and the environment and can set up numerous benefits for human welfare. It can empower economic growth and connect individuals to essential services. Notwithstanding, it can likewise create various challenges. Recent studies highlight that current patterns in transportation are unsustainable, there is an urgent need to adopt low carbon solutions for

transportation, while additionally lessening the need for travel (Banister, 2011). Private vehicle dependant development is viewed as a significant issue identified with unsustainable transport on an urban scale. A major issue that is prominent in auto-dependent cities that significantly impacts their sustainability is congestion. Congestion is portrayed by low traffic flow rate, and a high density of vehicles and is a crucial issue related to auto dependence. Congestion has been considered a global phenomenon that is brought about by expanding automobile dependence (Moavenzadeh and Markow, 2007). Negative effects include – increase in pollution, loss of economic, human and health impacts, and loss of economic productivity. At the point when a system neglects to give satisfactory degrees of mobility to various trip purposes and various modes, it is viewed as unsustainable from an economic and social perspective (Banister, 2005). There may likewise be environmental impacts related with having a single kind of user or single-mode dominating a transport system—various social, environmental, and economic problems were generated due to the increasing car use. Steg (2007), argued that the estimated cost of congestion in Europe cited is 100 billion Euro per year and anticipated to double in the following decade (Steg, 2007).

According to Hynes and Malone (2020) Moves towards decarbonising the Irish economy must concentrate emphatically on decreasing car reliance, especially in cities and towns. Car reliance is likewise costly in relation to social and economic externalities. Public transport is a system that enables groups of people to travel together on planned courses, regularly for a charge or fee. By transporting a huge number of individuals more effectively and efficiently, public transport assumes a significant role in mitigating traffic congestion and air pollution and is one of the key components in making cities and towns both economically competitive and environmentally sustainable. Factoring in these costs it turns out to be evident that putting resources into public transport is a social good and

exemplifies value for money for nations confronting climate challenges. Public transport in Ireland takes the form of buses, train and light rail tram system and exist mainly in urban centres (Hynes and Malone, 2020). Confronted with impacts and effects of the COVID-19 pandemic, public transport in Ireland presently faces new difficulties in the short term in periods of social distancing rules, reduced capacity, and a huge economic downturn. Hynes and Malone (2020) argued that it is crucial for policy and decision-makers take a long-term perspective on the utility of public transport and make an effort to defend and, also, increase expenditure to ensure a transport system that will be required on the resumption of full economic activity soon. The alternative is to make backward strides that will see a return to interminable car dependence and its subsequent social, economic and environmental harm (Hynes and Malone, 2020)

Anik *et al.*, (2017) paper describe who might be open to utilising public transport all the more frequently, and how individuals may be convinced to utilise it. Anik *et al.* (2017) study argued Public transport is regularly perceived to be a poor option for car use. The study uncovered that particularly frequent car users disliked public transport. For them, the car outperformed public transport as a result of its instrumental function. Additionally, in light of the fact that the car represents cultural and psychological values, for example, the car is an image of opportunity and freedom, a status symbol and driving is pleasurable. Occasional car users judged less negatively about public transport and less positive about the car. Thus, they might be available to utilise public transport more frequently.

Conversely, many efforts are expected to stimulate frequent car users to travel by public transport, in light of the fact that in their view, public transport cannot contend with their private car. For this situation, policies ought to be planned for lessening the practical, psychological, and cultural value of private cars, just as expanding the presentation of

public transport and other (more) environmentally friendly modes of transport on these viewpoints. Urban centres around the world are turning out to be private car-dominated and less sustainable daily. So as to constrain the growth of private cars and to proficiently attract the commuters from private vehicle to public transit, the study aimed to recognise the elements motivating the commuters to utilise public transport and to discover the attributes of public transport which need earnest improvement. The research covered perception of public transit service performance, private vehicle users inclination to change to public transport, the connection between the inspiring, motivating factors and the socio-demographic characteristics of the respondents in the city of Dhaka (Anik *et al.*, 2017).

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

The method of exploring substantive issues with a view to add to existing literature or assemblage of information in a discipline is characterized as research (Myers 2009, p 6). All things considered; one can hypothesize that research methodology is a method of taking care of any research issue – in an orderly manner. In the same vein, it is considered as a specialty of concentrating how research is completed on a scientific premise. In it, the explanations of the different advances that are received by this research would be investigated. As Saunders noticed, the premise of utilizing any technique used recorded as a hard copy is reliant on the improvement of philosophy utilized (Saunders, 2015).

Similarly, one can argue that typical methodologies and strategies come into use when one undertakes any research. This research strategy incorporates particular frameworks and techniques used to get and shield data for the research. That is, the researcher experiencing the examination uses diverse instruments accessible to him or her to get the necessary data and separate it (Saunders, et al., 2012). Notwithstanding, a research methodology fuses using hypothetical and philosophical assumptions on which the research is based. As Creswell, lays it out plainly, it requires the researcher to give a method of reasoning or contention to whatever approach that would be taken to do the research and collect data (Creswell, 2014).

From the above, the procedure of this study thinks about the occasion of data, analysing of information got from data, as well as the blend and investigation in responding to the proposed research questions and postulating recommendations through conclusions. Two

prominent classes of methodology are qualitative and quantitative strategies. However, this research adopts a quantitative method of research – this implies that the work is predicated on quantitative sources of data.

The imperative objective of this study is to examine the effects of mobility services on the travelling behaviour of commuters in the Dublin area of Ireland. In transmitting this objective into a research, a research question was formulated – within this question, sub questions were formulated. It is pertinent to note that these questions are tailored towards exploring the impacts of mobility services in retrospect of travelling behaviour in Ireland – using the private versus public transport debate. This then transcends into the researcher identifying the underlying challenges of mobility services in Ireland.

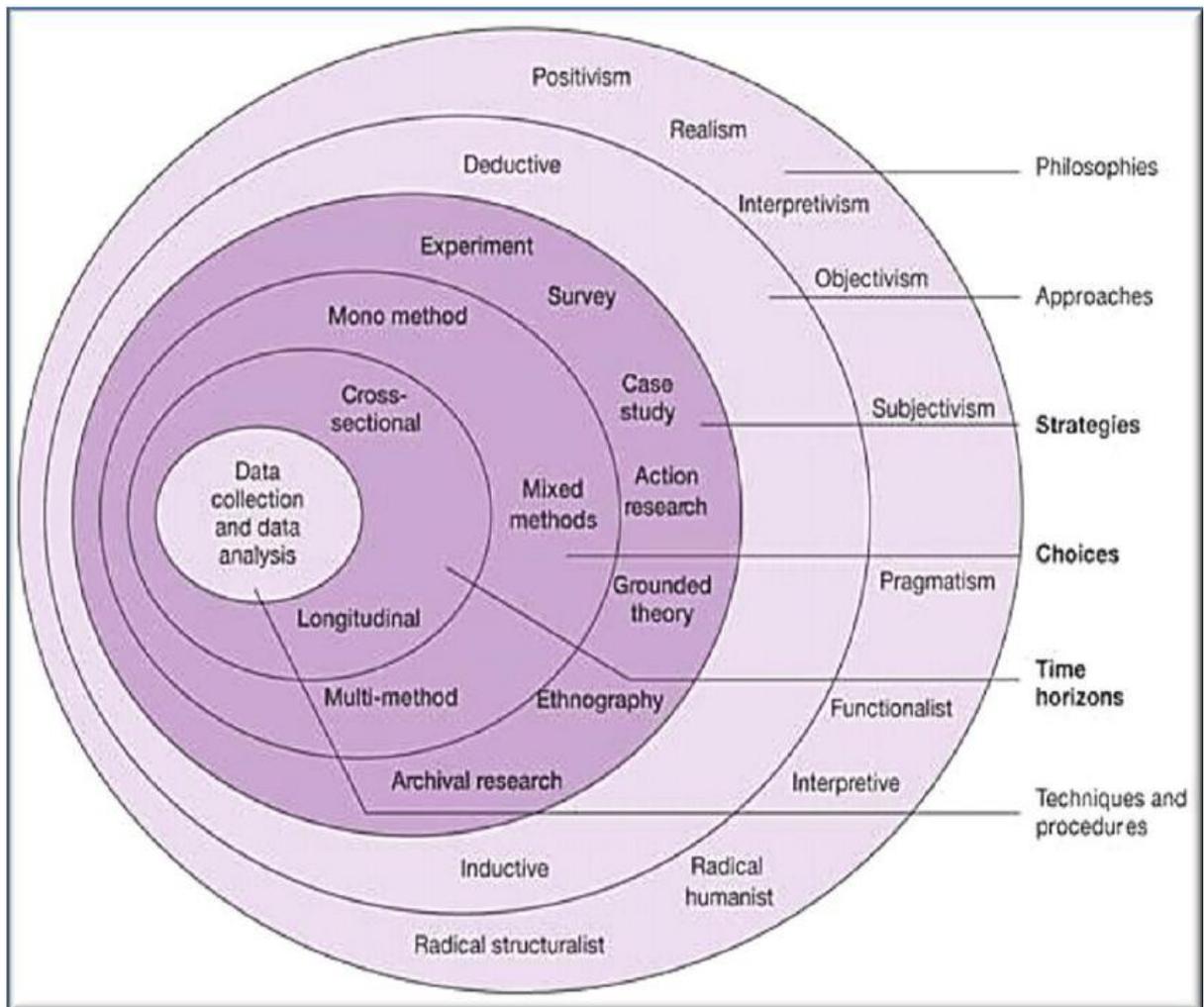
Similarly, the researcher would be examining the perception of people – with the lens of exploring the impact that private ownership has over public transportation services in Ireland and vice versa. It is the hope of the researcher that this examination would transcend into accumulating data to gauge if, perhaps, there is a thin line between easy access to mobility services and the factors that militate influence on the travelling behaviour of commuters in Ireland.

### **3.2 RESEARCH DESIGN**

It is pertinent to note that the completion of any research work is reliant on the strategies which are utilized to examine answers drawn from the research questions. To gather data, one needs to structure questionnaires. In organizing this, the questionnaire needs to give away the perceptions of issues engaged with the research (Saunders *et al.*, 2009). Saunders *et al.*, (2009), in his analysis, consolidated different stages or periods of a research process. These stages are critical to the achievement of a research, and they have been delegated layers of an onion (Saunders *et al.*, 2009). These five layers include:

research philosophy; research approach; research strategy; time horizon; data collection and analysis.

Comparatively, this research grasps the research onion refined by Saunders, *et al.*, (2012). This is introduced on the various layers that the onion wraps. In that limit, this incorporates the researcher picking an applicable theoretical paradigm, relevant philosophies and techniques. Similarly, it incorporates the researcher picking a suitable method which would be used in the combination and assessment of the data assembled from research.



*Fig. 1: The Research Onion (Saunders et al., 2009, p.138)*

### 3.3 RESEARCH PHILOSOPHY

It is appropriate to take note of the fact that a research philosophy incorporates three vital ways which are: epistemology, ontology and axiology. These philosophical patterns reflect particular habits by which a researcher forms the examination that is being thought of. The epistemology fixates on how we understand things, that is, it focuses on the worthy information in the field of research study (Saunders *et al.*, 2009).

The ontology fixates on the possibility of this present reality and looks at what one can genuinely know. It depicts two manners by which social on-screen characters are concern and unconcern of their reality (Saunders *et al.*, 2009). The axiology looks at the estimations of choices. Besides Saunders, *et al.*, (2012), analysed how, in all periods of the research, a researcher can work with speculations. In the expressed examination, these assumptions or suppositions are grasped in the way with which a researcher can see or inspect the world and join any research.

As Burns and Burns (2008) proposed, it is significant for a researcher to embrace a philosophical situation, at the beginning stages of any research. This is on the grounds that it will affect the way the research would be driven (Burns and Burns, 2008). Considering this, the structure picked can influence the philosophical decisions used by the researcher. As substantiated by Saunders, portraying the philosophy of a research can grasp an inexorably explicit research technique, and as such clarify the research procedure (Saunders, *et al.*, 2012). Regardless, there is no research plan that is better than the others. This is on the grounds that researchers fit the research plan in arrangement with the research questions. Consequently, particular theories or theoretical paradigms are placed into thought when executing a research.

From the above, it is pertinent to note that a theoretical paradigm includes the recognizable proof of the fundamental premise that is utilized to develop a scientific examination. That is, it is "a free assortment of sensibly held together suspicions, ideas,

and suggestions that orientates thinking and research" (Bogdan and Biklan 1982, p. 30). For the purpose of this research, the theoretical or philosophical paradigms which would be considered include: Positivism, Interpretivism, Pragmatism, and Realism.

### **Positivism**

Positivism, in the translation or comprehension of a phenomenon, adjusts to a perceivable social reality (Kumar, 2011). This is on the grounds that it encompasses distinctive feelings of how one can look good to others. This is inherent in the fact that no one is faultless and there are certain defects in our development. In testing hypotheses and building up a theory, one can place that this methodology is deductive. The possibility that research esteem is free; that the social world exists distantly and is seen equitably; and also the possibility that researchers are self-sufficient which energizes them play the activity of a target research expert; are the three strands that comprises the standards of positivist methodology (Saunders, *et al.*, 2012).

In considering the above-mentioned, one can argue that the positivist methodology embraces quantitative strategies. This is on the grounds that it is generally deductive – with its significant level structure (Saunders, *et al.*, 2016, p. 137). Sekaran and Bougie (2016), in their investigation discusses positivism as a way to deal with get at the real world. This is on the grounds that the methodology believes that there are more than one reactions for any research issue out there. Accordingly, hypotheses and questions attempted are subject to a fixed, pre-arranged research design and target measure(s).

### **Interpretivism or Constructivism**

This paradigm, in fathoming authoritative conduct, relates to the components of business, leadership and management research. As substantiated by Hunt, the paradigm gives a procedure to looking at the convictions of every respondent instead of examining an outside reality, for example, the clear and intelligible monetary and technological

elements of management (Hunt 1991). From the foregoing, one can posit that this paradigm embodies a more subjective methodology as opposed to being objective. This reverberates with the paradigm relating to the investigation of a social phenomenon in their indigenous environment. This implies that the philosophical methodology relies upon the thought and sentiment of every person. This is on the grounds that such thought and feeling explains social conduct (Saunders, et al., 2012). The key rules that establish this paradigm are premised on the fact that: the research is driven by intrigue; the researcher is a piece of what is observed; the social world is built and is given importance subjectively by individuals.

Given the above, it is significant for the researcher to comprehend the differences between people in our activity as social actors. This is on the grounds that inside the constructivist approach, discernments by itself is not reality. Here, reality is a mix of recognitive observations and external reality. Discernments are significant for they help with analysing complex reality, however recognitive observations cannot be the focal point of constructivist research (Creswell, 2014).

### **Pragmatism**

Pragmatism communicates that thoughts are simply appropriate when they support a movement (Kellerman and Rubbens 2008). Similarly, Saunders, et al., (2012), contended that to an extent if an idea has the sponsorship of an action then it winds up being significant. A Pragmatist individual grasps that there are a wide scope of techniques for interpreting things all through the regular daily existence. It also bears postulation to the fact that it is bias to specify that just one way is correct. This specifies researchers can use particular philosophical methodologies and would have more than one result achieved. As showed by Sekaran and Bougie, (2016), pragmatism does not take a particular view on the research. It usually considers the consequences of a research as a fleeting reality. This

is on the grounds that pragmatism supports that the back and forth movement of reality changes over the time.

### **Realism**

This theoretical paradigm grasps the scientific stage for the formation of knowledge. This is premised on the fact that it has parts of both positivism and constructivism (Perry et al., 1997). As Hunt (1991) postulated, this paradigm is also called critical realism. Other names include post-positivism (Denzin and Lincoln 1994; Guba and Lincoln, 1994) or neo-post positivism (Huberman and Miles 1985; Manicas and Secord 1982). Realism gives a world view wherein a certified social paradox can be found in spite of the way that it is imperfect and having a high likelihood of not being justifiable (Guba and Lincoln 1994; Merriam 1988; Perry and Coote 1994; Perry, et al., 1997; Tsoukas 1989). That is, for realists the best approach to choose the reality of a social paradox is through the triangulation of discernment forms. As postulated by Perry et al., (1997, p. 554), a recognitive observation for realists is a window unto reality from which a picture of reality can be triangulated with other observations.

From the foregoing, the researcher considers the realist philosophy. This is premised on the grounds that; the paradigm is a combination of both the positivist and interpretative research philosophy. The substance of realism in this research is the way that it ascribes to what exactly reasoning show us. This is on the grounds that it portrays reality as facts and fuelled with the presence of autonomous human convictions (Saunders et al., 2009). It is pertinent to note that there are two kinds of realism. They include empirical realism – which specifies that reality can be uncovered with the utilization of proper method(s) (Saunders et al., 2009). Then again, critical realism which proposes to recognize the reality of normal occasions and request of social world (Saunders et al., 2009). Therefore, the target of this research along the lines of this paradigm is to explore the underlying

challenges of mobility services in retrospect of travelling behaviour in Ireland – with the aim of gauging the impact that private ownership has over public transportation services in Ireland and vice versa. This is depicted by the researcher along the lines of recognitive observations of the phenomena in general view of social reality.

In adopting realism, this research takes into consideration that the researcher is of the opinion that cost, time management, and flexibility rather than just environmental factors makes light of a significant factor in breaking down the chain of travelling behaviours in Ireland. In taking on this type of understanding, the researcher would identify the reality of natural event by using appropriate methods like conducting surveys, to give a world view on how the easy access to mobility services influence travelling behaviour of commuters in Ireland – with the aim of gauging the impact that private ownership has over public transportation services in Ireland and vice versa. This is in considering the fact that it may be flawed and maybe has a high likelihood of not being understandable. During data analysis and collection, this philosophical method considers the presentation of statistics, tables, numbers, and charts, among others.

In affiliation to the research ontology (nature of reality), the research will focus on a subjective way to deal with managing the examination of data. Considering that reality, the research will incorporate the need of data examining from empirical end user populace. Here, the researcher conducts surveys – with the help of questionnaires, to accumulate primary data. The activity of the researcher as showed by (Saunders, et al., 2012) is to, "attempt to grasp the subjective reality of these respondents towards having the ability to comprehend and fathom their perspectives, activities and points in a way that is significant.

### **3.4 RESEARCH APPROACH**

As substantiated by Saunders *et al.*, (2009), inductive and deductive approach establishes the two types of research approach. The innate linkage of theories and the research is the thing that exemplifies the deductive approach (Bryman and Bell, 2011). Hence, one can argue that this approach sees the affiliation among theories and research as something fundamental. This is streamed in facets where hypotheses and recognitive observations got from any of the theory is used to do the research. Saunders, et al., (2012), in their examination, alluded to the deductive approach as a scientific research. Similarly, Hussey and Hussey, (1997), takes note of the fact that an examination tried by empirical perception, in which a reasonable and theoretical structure is delineated is alluded to as deductive research.

It is pertinent to note that the deductive approach is used essentially with quantitative research. This is on the grounds that the accentuation of a quantitative research is using information or data to test hypothesis and/ theory. It is relevant to take note of the fact that deductive approach can bring about a theory, if the sample has a great size. Nonetheless, the major issue related to this approach is the right significance of the hypotheses and premises. The inductive approach is the direct inverse to deductive approach – from both names. However, in contrast to deductive approach, there is no comparable affiliation between theory and research in inductive approach. The inductive approach relies upon perceptions and empirical verification to assemble, codify or change any theory (Saunders, et al., 2012). In the same pattern, this approach does not hope to test a theory but instead the information gathered during the course of research is utilized as a measuring stick to develop theories. Therefore, one can argue that the theories portrayed in such research are subject to the data assembled.

From the foregoing, the researcher adopts the deductive approach. This is because the trend of this research moves to use the data collected to test hypothesis on how the easy access to mobility services influence travelling behaviour of commuters in Ireland – with the aim of gauging the impact that private ownership has over public transportation services in Ireland and vice versa. It is pertinent to understand that in using a deductive approach, the researcher – in analysing data, can diffuse the nexus between the data collected and the hypothesis/theory developed for this research before data was collected (Saunders et al., 2009).

### **3.5 RESEARCH STRATEGY**

As substantiated by Saunders, *et al.*, (2012), a research strategy gives the researcher a key structure on answering the stated research question(s) (Saunders, *et al.*, 2012). It is pertinent note that the research strategy depicts the stages or stages on how these research question(s) would be answered – in arrangement with the research objectives. Premised on this, Saunders, *et al.*, (2012), expressed that the idea of any research work can be arranged into the following: exploratory, descriptive, and explanatory (or a mix of them). Following the proposition of the deductive approach, which permits the researcher to utilize data collected to test hypotheses in satisfying the necessity of a research. This research adopts an exploratory approach. This approach simply empowers the researcher to make sense of what's going on, to investigate new ways, to pose inquiries and explain the comprehension of a research issue (Saunders *et al.*, 2009). In that capacity, this research is tailored to engrave data, which is accumulated on various person's knowledge, their interpretation, just as their encounters of rationale and thinking on an issue (Saunders, *et al.*, 2009).

Therefore, this research adopts a survey strategy. The researcher accepts that adopting such strategy would answer the research question which is aimed at an analysis of how the easy access to mobility services influence travelling behaviour of commuters in Ireland. In actualizing a survey strategy, a survey will permit the aggregation of data from chosen respondents to accomplish an objective view. The survey is designed to complete, investigate and create opinions on the predefined subject of research. In adopting this strategy, the researcher is of the opinion that this will bring the research under the researcher's control and would be objective.

### **3.6 RESEARCH METHODOLOGY**

The two types of research methods include qualitative and quantitative. One can also argue that a researcher can adopt both techniques leading to a mixed approach in a research. Quantitative methodology is used in a data collection strategy using numbers and figures. These incorporate statistics and graph which centres on words or numeric (Saunders *et al.*, 2009). Conversely, the qualitative method deals with the age of non-numeric data from respondents with respect to the order or classification of data. This type of approach manages absolutely the dimension of exploration and analysis. All things considered, it alludes to the data that are comprehensive of pictures, respondents' recognitive observation – through the medium of video and audio clips (Saunders *et al.*, 2009).

This research adopts the quantitative approach. This is on the grounds that the quantitative method presents the researcher with a foundation of sampling representatives of a populace to gather data (Saunders, *et al.*, 2012). In experiencing such courses, the data will be investigated against the results of the populace – in a statistics form. This is pursued by using a questionnaire across the study's identified research populace. It follows that from the data got from the research population, the researcher can break

down definitively on the outcomes given. One can argue that this type of approach is utilized when the researcher needs to characterize implications, thoughts, convictions, value and experiences (Saunders *et al.*, 2009).

As indicated by Langen (2009), this methodology interprets experiences of people and the world in which they live to examine values, conduct and points of view which highlight the comprehension of the components (Langen, 2009). All things considered, the utilization of quantitative methods encourages the researcher to concentrate on gathering and breaking down data – with the aim of testing the proposed hypothesis in satisfying the necessity of this research. For this study, the selection of both qualitative and quantitative methodologies was considered at inception. However, due to the Covid-19 implications the philosophy of conducting a sit-down (one-on-one) in-person interview was waived. This is because of the process the researcher would go through in order to get an interviewee to accept to a zoom or skype meeting date – within the limited time frame. This empowered the researcher to proceed in actualizing the deductive approach in carrying out the quantitative method.

### **3.7 TIME HORIZON**

Cross-sectional and longitudinal structure the two kinds of time horizons. The Cross-sectional time horizon conforms to driving a research over a short period of time. While the longitudinal time horizon conforms with a research that goes on over some interval or a stretch of time. What this does is that these structures in the course of a research, empowers the researcher to follow changes and improvements during the time of the research.

At this juncture, the researcher notes that the time horizon for this research is time limited. Therefore, it reverberates with the cross-sectional time horizon – which was the main alternative accessible, at the inception of this research. This is because the essential

concern of the researcher is to finish the MBA programme which is bounded by a time outline. The main burden that this puts is the glaring truth on the inconceivability of the researcher assessing changes that are happening or occurring with the respondents over time (Saunders et al., 2009).

### **3.8 DATA COLLECTION**

Data collection in a research typifies the collection of autonomous data and/or potential figures which will help the researcher in conducting the proposed study. There are two fundamental types of data collection in leading or supervising a research. These are: Primary data and Secondary data. Primary data collection comprises of different data gathered from respondents – as questionnaires (Pieters, 2014). This type of data collection is fitted to meet certain standards required in a research. It is pertinent to note that this data must be gathered from the specific populace intended for the research. This is premised on the postulation that the data does not yet exist (until after data collection). As substantiated by Saunders, *et al.*, (2012), questionnaires are usually distributed through web-based questionnaires, postal questionnaires, and face-to-face questionnaires, among others, to gather primary data. It is critical to take note of the fact that in managing this feature of primary data, the researcher is not guaranteed an expected outcome of response(s). This is owed to the direct result of varieties that play out under such condition(s).

Conversely, secondary data are data which are sourced from peer-reviewed journals, newspaper articles, conference reports, textbooks, handbooks, and magazines. In contrast to the primary data that does not exist – until the data is gathered from respondents, the secondary data as of now exists in the sources recorded above – which are promptly accessible for researchers. As supported by Pieters, (2014), it establishes an in-depth analysis of literature review which bolsters the researcher to gain foundational knowledge

on the proposed topic of research (Pieters, 2014). It also helps the researcher to develop the survey questions – through the literature subjects. This research, in dissecting its research question and sub questions, utilizes both primary and secondary data.

### **3.8.1 QUANTITATIVE DATA PROCESS**

While leading or supervising an investigation – with the utilization of a quantitative data process, a lot of explicit inquiries are structured into a questionnaire for data gathering. In that capacity, these inquiries could be structured online by the researcher – utilizing Survey Monkey or Google forms to separate the reactions. In addition to this, the reactions or responses would be examined after the aggregation of data has gained the correct equilibrium. It follows that the questionnaire will include diverse stages that guide the researcher to form a fitting and balanced questionnaire – with the objective of guaranteeing a higher response rate by respondents. It is pertinent to note that the researcher embraced the online methods on the grounds that the online presence produces a unique link for the researcher that would be effectively open to the populace to take part in the survey. In this manner, the link produced will be conveyed to targeted populace – utilizing email databases and social network platforms such as LinkedIn, WhatsApp, Facebook, Instagram, among others. It is this generated link that will at that point direct the respondents to the site to complete the survey.

In light of the above, one can argue that the utilization of survey monkey or google forms will convey the researcher with the favoured results of the structured questionnaire. This, at that point obliges a significant investigation of the results by the researcher. Comparatively, the survey monkey or google forms medium is profitable to the researcher – as it requires just an internet or wireless network connection, with carrying out these differing assignments. In the period of drafting the inquiries, the researcher embraced the utilization of short and clear inquiries (utilizing the strongly agree or

disagree mode of request). In that capacity, the assignment for this method of request was considered by the researcher so as to maintain the respondents' excitement in tending to the survey inquiries till the end of the questionnaire or avoid the challenges of exhaustion while offering responses.

In this research's quantitative data process, the researcher used survey monkey to delineate the questionnaire and to scrutinize the reactions. At this juncture, it is important to note that the researcher decided to utilize survey monkey – rather than google forms. This is owed to the fact that it was effortless to structure the questionnaire given the various options accessible to the researcher on the site. In that capacity, these options are valuable in helping the researcher to fitting the questionnaire to suit a versatile method of investigation – either by tables, graphs, among others. Additionally, the researcher can screen the track of what number of respondents has taken the survey on the site.

### **3.9 MATERIALS**

#### **Travel behaviour**

One of the key variable is travel behaviour, which can be formed by both external and internal factors and individuals decision making processes about choice of transport mode(Xia *et al.*, 2017). Most common framework used to predict individual intention and behavioural outcome is the theory of planned behaviour(TPB) and their perceptions of subjective norms with perceived behavioural control (PBC) which determines their intention to act (Godin and Kok, 1996), (Armitage and Conner, 2001).

#### **Attitude towards sustainable transport**

According to Xia et al. ( 2017) attitudes towards comfort, flexibility and time could influence the choice of mode of transport. Furthermore, the study also stated while there are growing awareness and concern among the public about environmental issues( even being vocal about it) with a questionable controversial travel behaviour.

**Table 3.1 : Key Variables**

Category	Items	Reference
Characteristics of transport facility	Efficient and reliable public transport; cost ; Reliability.	(Cattaneo <i>et al.</i> , 2018), (Xia <i>et al.</i> , 2017)
Commuter characteristics	Income; jobs status, frequency of travel, vehicle ownership	(Xia <i>et al.</i> , 2017), (Madhuwanth <i>et al.</i> , 2015)
Characteristic of the journey	Purpose of trip; Time of the day; Trip taken alone or with others	(Xia <i>et al.</i> , 2017) (Madhuwanth <i>et al.</i> , 2015)

A questionnaire would be developed to measure each variable identified above for the quantitative phase of the research. The questionnaire would be broken down into 4 sections as described below (Refer to Appendix A)

### **Section 1 Demographics**

This part of the questionnaire would gather information of socio-demographics of the participant the following characteristics would be measured : Age, gender, education, work status, Income .

### **Section 2 Travel behaviour**

This part would measure participant current travel behaviour. Participant would self-report on their bicycle use, kilometres driven annually(as driver), frequency use ( as a passenger or driver) and their primary mode of transport.

### **Section 3 Attitude towards traffic, environment and health**

This part would contain various attitudinal questions regarding their perception regarding the effect of traffic towards sustainable transport and possible perceived barrier towards the use of sustainable transport modes. A 5-point Likert-scale would be used to assess their level of agreement with the attitudinal statement.

#### **Section 4 Perception of potential effective transport measures**

This part participant would be asked to respond to various measures for reduction of car use and promotion of sustainable transport mode (public transport, cycling, walking, bike sharing and car sharing). The effectiveness would be rated from 1 to 4 with descriptors (not effective at all, don't know, fairly effective and very effective).

#### **Section 5 Commuter current overall experience of public transport (Dublin bus, Dublin train, Dublin tram and Dublin bike)**

This section of the questionnaire assesses the participants overall experience of public transport (Dublin bus, Dublin train, Dublin tram and Dublin bike) . The experience would be rated from 1 to 5 with descriptors (excellent, Good, Neutral, Satisfactory, unsatisfactory).

The measurement tools used for this research project was gotten from a previous research which undertaking by Ting Xia from Monash University, Clayton Australia, Ying Zhang from the University of Sydney, Sydney, Australia, Annette Braunack-Mayer and Shona Crabb from The University of Adelaide, Adelaide, Australia with the title “**Public attitudes toward encouraging sustainable transportation: An Australian case study**” Received by the International journal of sustainable transport in February 2016 and was revised and accepted in January 2017 .

### 3.10 RELIABILITY AND VALIDITY OF RESEARCH INSTRUMENT

The work under study went through thorough scrutinizing by experts in the field of academics, as well as the researcher's supervisor who examined the content of the instrument. Their advice and constructive criticism was very useful in the production of the final draft of the instrument. Indeed, reliability indicates the extent to which an instrument is error free and thus, consistent and stable across time and also across the various items in the scale (Bougie & Sekaran, 2010). To enhance the reliability of the findings, ten percent (10%) of the sample size amounting to fifteen (15) respondents were selected. The output was calculated using Cronbach's Alpha and allows researchers to measure the reliability of different variables. As a general rule, a co-efficient greater than or equal to (0.7) is considered acceptable and good indication of construct reliability (Nunnally, 1978). Hence, it can be concluded that the measurement instrument was reliable. The result generated from the pilot study is given below.

**Table 3.2:** Reliability Statistics

S/N		Cronbach's Alpha	No of Items
1	Travel behaviour	.825	3
2	choice of transport	.818	5
3	Attitude towards traffic, environment, and health	.759	6
4	Perception of potential effective transport measures	.731	7

**Source:** Field Survey (2020)

### 3.11 DATA SAMPLING

From the foregoing, it is pertinent to note that sampling and selection are instruments and rules that are used to perceive, pick, and access relevant data sources in a research by the researcher. As expressed by Saunders *et al.*, (2012), the two sampling procedures include probability sampling and non-probability sampling (Saunders *et al.*, 2012). Probability

sampling deals with a selected faction from a known populace which will effectively tick all the crates in all the cases planned by the research. Conversely, non-probability is the opposite as it envelops the researcher managing an obscure populace to get data which would be utilized to speak to the cases structured by the research.

Considering the above, the objective of this research, in fulfilling the necessitated structure by the research, is to gain data about the shifting qualities and boundaries of commuters from the studied populace in the surrounding region of Dublin, Ireland. The populace concentrated in this investigation is predicted to have the option to give components that would help in addressing the primary research questions and unravelling the research problem. In that capacity, this populace is characterized with respect to every respondent, sampling units, degree and time – through the probability sampling method. . The population for this study includes commuters that reside in the Greater area of Dublin between the age of 18-65. This would capture frequent and active mobility within the age bracket. The prerequisite of participating in the survey is commuting within the Greater area of Dublin and must be a resident of the county. However, business related travel of professional drivers e.g. bus and taxi drivers would be excluded from the survey due to overdependence of one mode of mobility for travel.

### **3.12 METHOD OF DATA ANALYSIS**

In examining data, inferential and descriptive statistics was selected. This is to ensure the breakdown of bio data and the recognitive observation of the research questions in testing the hypotheses proposed. Pearson correlation statistics was also selected to acknowledge or dismiss the hypotheses proposed. This was followed so as to decide the nexus and the degree between factors at hand.

### 3.13 RESEARCH ETHICS

The craft of participating in a fitting conduct with the people who have now become the focal point of a research is what is referred to as ethics in research. All things considered, it is the duty of any researcher to lead a research in an ethical manner (Pieters, 2014). Along these lines, one can contend that in guaranteeing an effective research, ethics assumes a crucial role. In going through a research, the research ethics ought to watch issues identified with the reliability and validity of the research (Saunders et al., 2009). The utilization of confidentiality is likewise key in this research. This is premised on the fact that data got from the idea of this sort of research cannot be conveyed without an approved channel.

Prefaced on the above-mentioned, the researcher targets leading a research that is crystal-clear by securing the privacy of the respondents. This fills in as an ethical methodology embraced so as to construct trust between the researcher and the different respondents (Pieters, 2014). In that capacity, the development of questionnaire would be based solely on such idea – to make the exploration reliable and valid (Saunders *et al.*, 2009). In this manner, in ensuring the privacy of every member – while organizing or planning the survey, the researcher would speak the truth about the research expectations. Similarly, the researcher would state to the respondents that the research procedure is voluntary, and any personal information given (in the example of name, work status, among others) would be kept in confidentiality with no sort of exposure. In like manner, the respondents will be taught that their consideration in the examination can be ended by them without giving any explanations, as they reserve the privilege to pull back whenever when attempting to fill out the survey.

### **3.14 LIMITATIONS OF RESEARCH**

A notable limitation of research can be traced back to the review of existing literature on transportation management and commuter's behaviour. This is owed to the fact that the subject matter has not reached a singular narration of conclusion from scholars. Which in turn served as one of the limitations the researcher was faced with. The implication of this was the fact that the researcher, in order to avoid bias in the systematic flow of the research argument, had to scrutinize each author on their respective postulations on the topic. Secondly, the inability of every respondent partaking in the survey posed another limitation of research. This was visible in the researcher's collection of data from the entire sample population. One can argue that the strands of this limitation can be traced to budget allocation and time constraint during the period of the research. In that capacity, the quantity and reliability of data collected would be affected.

According to the researcher, time constraint is tagged as the most striking limitation for this research. This is a result of the limited ability to focus in leading a research of this sort. This is owed to the fact that more numbers could be added to the real number of respondents that took the survey if there was sufficient time. Similarly, the researcher notes more grounds can be gained on this theme if the research was not carried out within the Covid-19 era. This is because interviews could have been conducted as initially planned by the researcher - which would have allowed for the researcher to engage in the mixed approach under the scope of the listed research methodologies. Taking everything into account, this study will achieve a more prominent measure of substance examination and present them in discourse investigation to make strong conclusions from them and also oversee expected tendency on the topic.

## CHAPTER FOUR

### DATA PRESENTATION, ANALYSIS RESULTS AND DISCUSSION

#### 4.1 INTRODUCTION

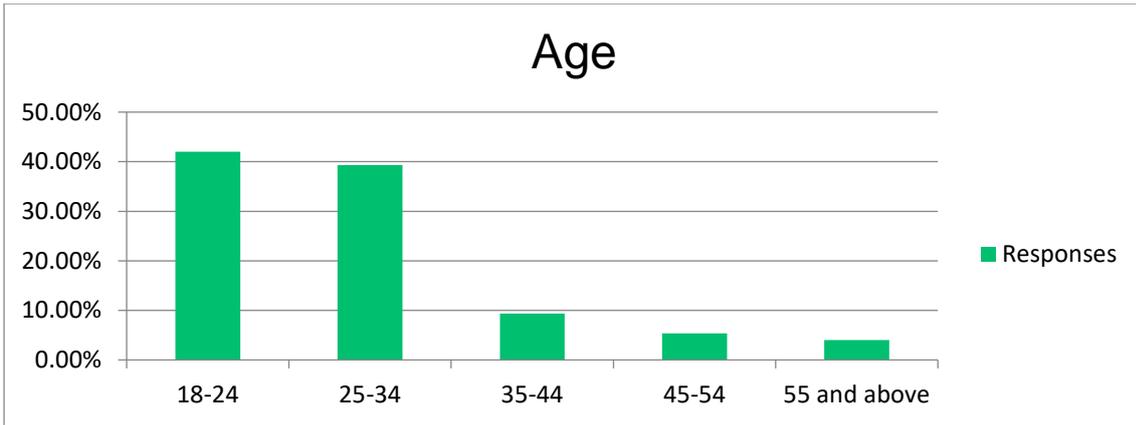
This chapter is based on the data collected from the questionnaire administered to commuters in Dublin Ireland. Indeed, a total of one hundred and fifty (150) copies of questionnaires were administered among the respondents while they were fully completed and returned. The analysis was carried out using Statistical Packages for Social Science (SPSS). Descriptive statistics of frequency count and percentage; and Pearson moment correlation were used to analyse the data collected in order to answer the hypotheses raised in this study. All statistical analysis was tested at 5% level of significance.

#### 4.2 Data Analysis

**TABLE 4.1: Personal Data of Respondents**

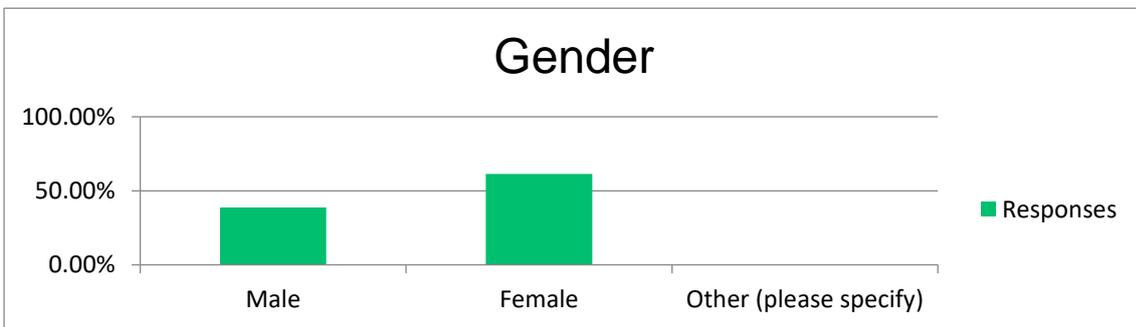
S/NO	Variable	Category	Frequency	%
1.	Age of Respondents:	18-24	63	42.0
		25-34	59	39.3
		35-44	14	9.3
		45-54	8	5.3
		55 and above	6	4.0
		<b>Total</b>	<b>150</b>	<b>100.0</b>
2.	Gender of Respondents:	Male	58	38.7
		Female	92	61.3
		<b>Total</b>	<b>150</b>	<b>100.0</b>
3.	Work status of Respondents	Unemployed	90	60.0
		Employed	10	6.7
		Student	43	28.7
		Self Employed	3	2.0
		Retired	4	2.7
		<b>Total</b>	<b>150</b>	<b>100.0</b>

**Source:** Field Survey, 2020



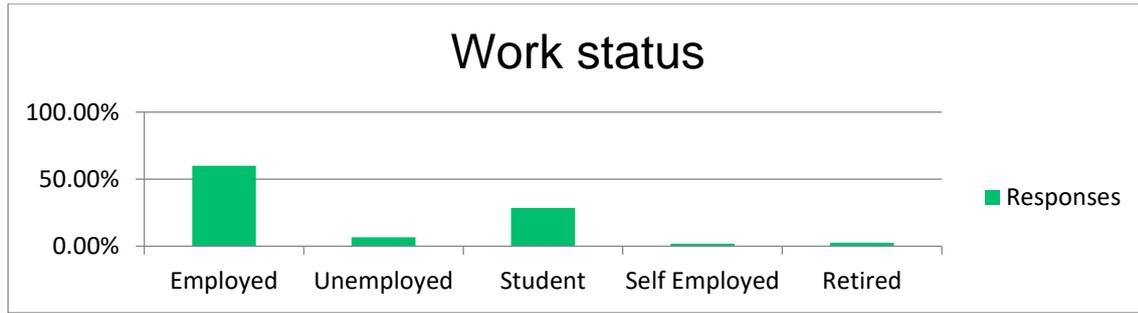
**Fig. 1 : Age**

It was observed from the above table in question 1 that 42% of the respondents were within 18-24years, 39.3% were within 25-34years and 9.3% were within 35-44 years and 5.3% were within 45-54years while 4% were 55years and above. This implies the respondents were matured to answer the research questions.



**Fig. 2 : Gender**

It was further observed from the above table in question 2 that 38.7% were male while 61.3% were female. This implies that more female were interviewed than their male counterpart.



**Fig. 3 : Work status**

It was observed from the above table in question 3 that 60% of the respondents were unemployed, 6.7% were employed, 28.7% were students and 2% were self-employed while 2.7% had retired. Thus, majority of the respondents interviewed were unemployed.

### 4.3 Presentation and Analysis of Data According to Research Questions

**TABLE 4.2 : Travel behaviours of respondent**

S/NO	Variable	Category	Frequency	%
1.	What is your commuting distance within Dublin	less than 1 km	13	8.7
		Between 1 and3 km	12	8.0
		Between 3 and5 km	16	10.7
		Between 5 and10 km	36	24.0
		More than 10 Km	53	35.3
		I don't know	20	13.3
		<b>Total</b>	<b>150</b>	<b>100.0</b>
2.	Are you a bicycle user	Yes	24	16.0
		No	126	84.0
		<b>Total</b>	<b>150</b>	<b>100.0</b>
3.	What is your main mode of transport within the Greater Dublin Area	Car (driver / passenger)	35	23.3
		Public Transport (Bus / Train / Tram)	95	63.3
		Bicycle	6	4.0
		Scooter	2	1.3
		Walking	6	4.0
		Combine	6	4.0
		<b>Total</b>	<b>150</b>	<b>100.0</b>
4.	How often do you make use of a private car either as a driver or a passenger	5 or more times in a week	36	24.0
		3 - 4 times in a week	20	13.3
		1 - 2 times in a week	29	19.3

		1 - 3 times in a month	40	26.7
		Never	25	16.7
		<b>Total</b>	<b>145</b>	<b>100.0</b>

Source: Field Survey, 2020

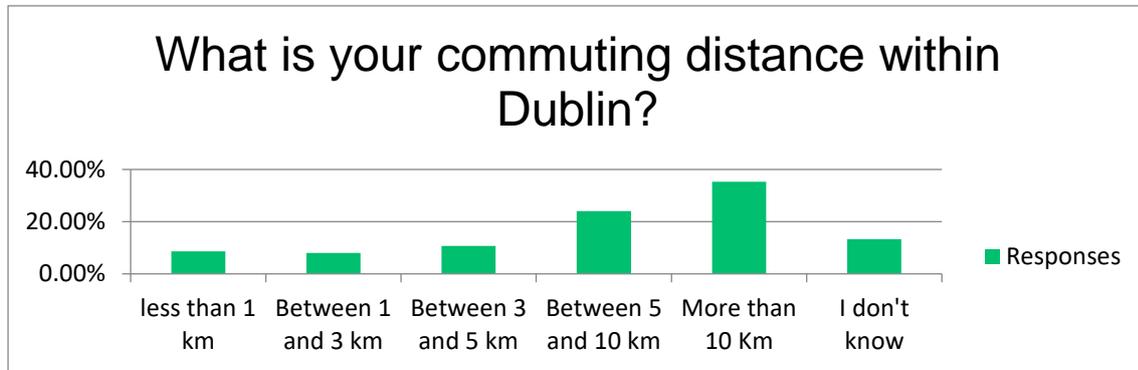


Fig. 4 : commuting distance within Dublin

It was observed from the above table in question 1 that 8.7% of the respondents commuting distance in Dublin Ireland were less than 1 km, 8% were between 1 and 3 km, 10.7% were Between 3 and 5 km, 24% were Between 5 and 10 km and 35.3% were More than 10 Km while 13.3% claimed they can't really calculate the distance.

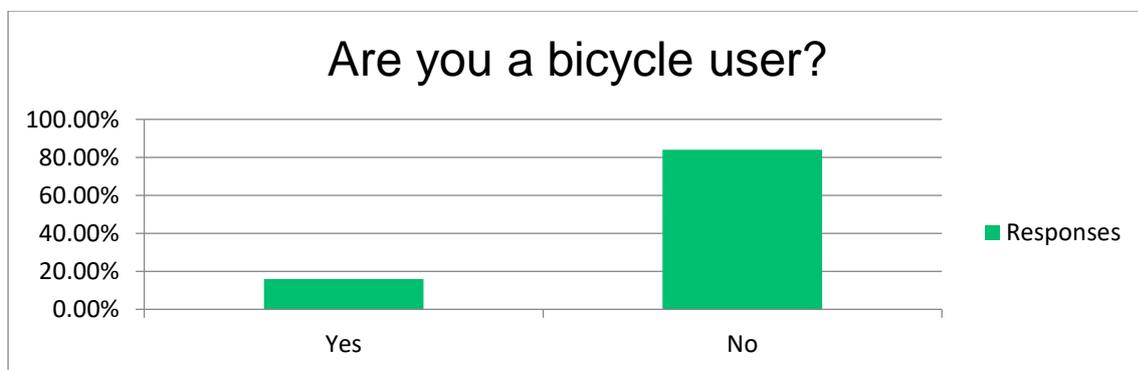
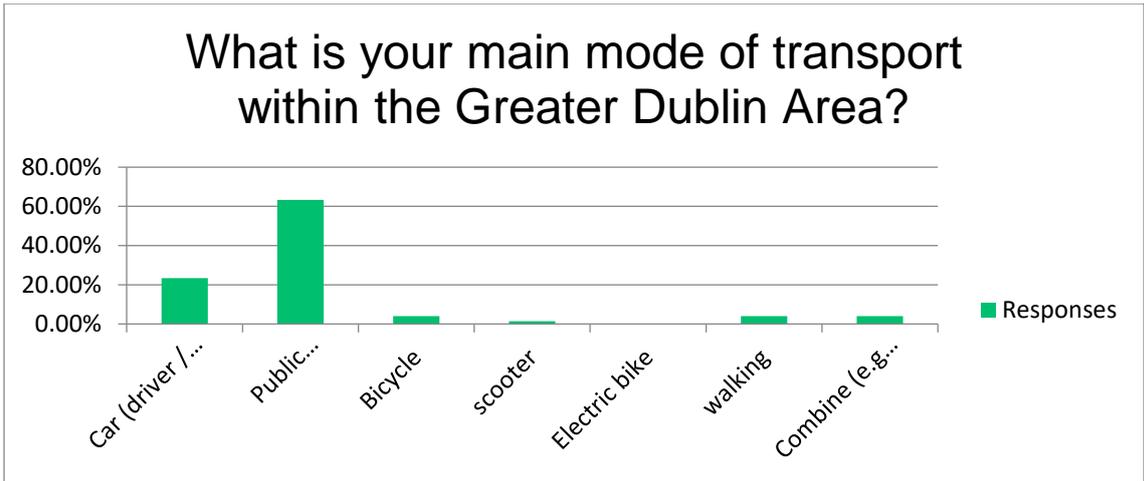


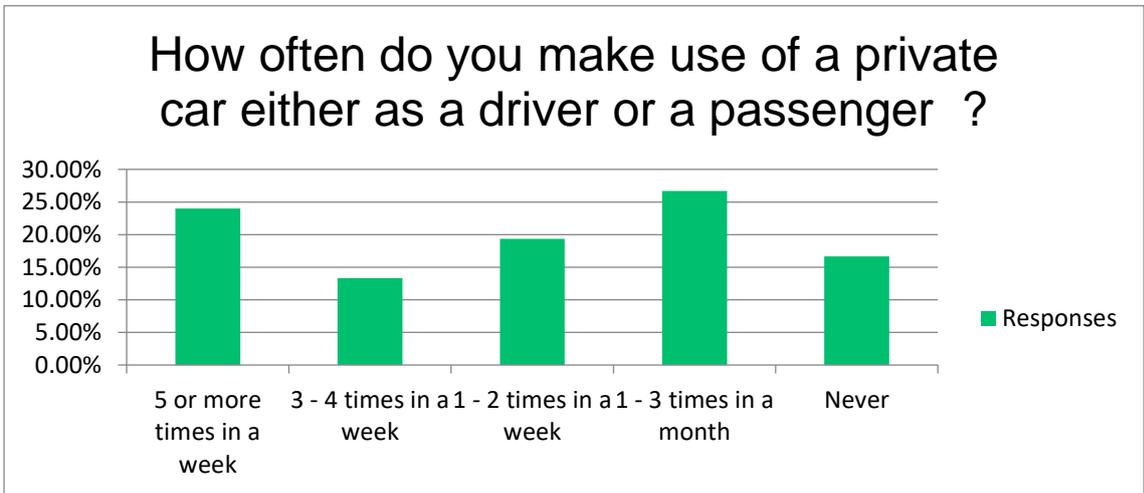
Fig. 5 : bicycle user.

It was further observed from the above table in question 2 that 16% of the respondents said yes that they were bicycle user while 84% said no to the assertion.



**Fig. 6 :** mode of transport within the Greater Dublin Area

It was observed from the above table in question 3 that 23.3% of the respondents confirmed that car (driver/passenger) is their mode of transport within the Greater Dublin Area, 63.3% revealed Public Transport (Bus / Train / Tram) is their mode of transport within the greater Dublin Area, 4% depict it is Bicycle, 1.3% assert it is scooter and 4% claimed they Walk while also 4% concur to the combine of all.



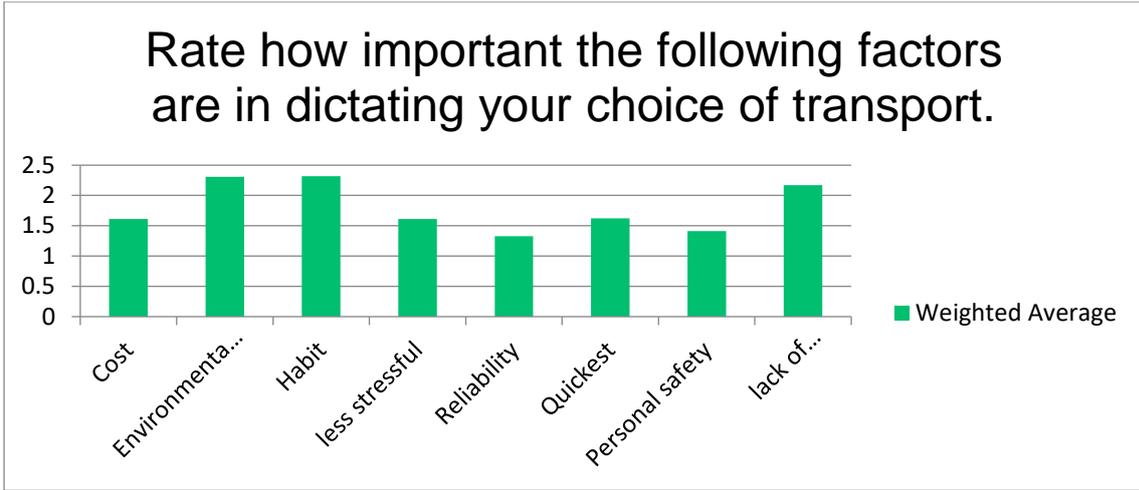
**Fig. 7 :** Frequency of Private car

It was observed from the above table in question 4 that 24% of the respondents claimed they often make use of a private car either as a driver or a passenger within 5 or more times in a week, 13.3% used within 3 - 4 times in a week, 19.3% used within 1 - 2 times in a week and 26.7% used within 1 - 3 times in a month while 16.7% claimed never to the assertion.

**Table 4.3 :Rate how important the following factors are in dictating your choice of transport?**

S/NO	Variable	Category	Frequency	%
1.	<b>Cost</b>	VERY IMPORTANT	87	58.0
		IMPORTANT	40	26.7
		NEUTRAL	17	11.3
		IRRELEVANT	3	2.0
		HIGHLY IRRELEVANT	3	2.0
		<b>Total</b>	<b>150</b>	<b>100.0</b>
2.	<b>Environmentally-friendly</b>	VERY IMPORTANT	33	22.0
		IMPORTANT	53	35.3
		NEUTRAL	52	34.7
		IRRELEVANT	8	5.3
		HIGHLY IRRELEVANT	4	2.7
		<b>Total</b>	<b>150</b>	<b>100.0</b>
3.	<b>Habit</b>	VERY IMPORTANT	31	20.7
		IMPORTANT	51	34.0
		NEUTRAL	56	37.3
		IRRELEVANT	10	6.7
		HIGHLY IRRELEVANT	2	1.3
		<b>Total</b>	<b>150</b>	<b>100.0</b>
4.	<b>Less stressful</b>	VERY IMPORTANT	87	58.0
		IMPORTANT	40	26.7
		NEUTRAL	17	11.3
		IRRELEVANT	3	2.0
		HIGHLY IRRELEVANT	3	2.0
		<b>Total</b>	<b>150</b>	<b>100.0</b>
5.	<b>Reliability</b>	VERY IMPORTANT	110	73.3
		IMPORTANT	31	20.7
		NEUTRAL	6	4.0
		IRRELEVANT	3	2
		<b>Total</b>	<b>150</b>	<b>100.0</b>
6.	<b>Quickest</b>	VERY IMPORTANT	79	52.7
		IMPORTANT	52	34.7
		NEUTRAL	13	8.7
		IRRELEVANT	3	2
		HIGHLY IRRELEVANT	3	2
		<b>Total</b>	<b>150</b>	<b>100.0</b>
7.	<b>Personal safety</b>	VERY IMPORTANT	109	72.7
		IMPORTANT	29	19.3
		NEUTRAL	6	4.0
		IRRELEVANT	4	2.7
		HIGHLY IRRELEVANT	2	1.3
		<b>Total</b>	<b>150</b>	<b>100.0</b>
8.	<b>Lack of alternative</b>	VERY IMPORTANT	48	32.0
		IMPORTANT	41	27.3
		NEUTRAL	49	32.7
		IRRELEVANT	8	5.3
		HIGHLY IRRELEVANT	4	2.7
		<b>Total</b>	<b>150</b>	<b>100.0</b>

Source: Field Survey, 2020



**Fig. 8 :** Important factors in dictating choice of transport

It was observed from the above table in question 1 that 58% of the respondents indicated very important that cost are important factors in dictating their choice of transport, 26.7% claimed to be important, 11.3% were neutral and 2% depict irrelevant while also 2% chooses highly irrelevant to the assertion.

It was observed from the above table in question 2 that 22% of the respondents indicated very important that environmentally-friendly are important factors in dictating their choice of transport, 35.3% revealed to be important, 34.7% were neutral and 5.3% assert irrelevant while 2.7% claimed highly irrelevant to the assertion.

It was observed from the above table in question 3 that 20.7% of the respondents indicated very important that habit are important factors in dictating their choice of transport, 34% revealed to be important, 37.3% were neutral and 6.7% assert irrelevant while 1.3% claimed highly irrelevant to the assertion

It was observed from the above table in question 4 that 58% of the respondents indicated very important that less stressful are important factors in dictating their choice of transport, 26.7% revealed to be important, 11.3% were neutral and 2% assert irrelevant while 2% also claimed highly irrelevant to the assertion

It was observed from the above table in question 5 that 73.3% of the respondents indicated very important that reliability are important factors in dictating their choice of transport, 20.7% revealed to be important, 4% were neutral while 2% assert to the assertion

It was observed from the above table in question 6 that 52.7% of the respondents indicated very important that quickest are important factors in dictating their choice of transport, 34.7% revealed to be important, 8.7% were neutral and 2% assert irrelevant while 2% also claimed highly irrelevant to the assertion.

It was observed from the above table in question 7 that 72.7% of the respondents indicated very important that personal safety are important factors in dictating their choice of transport, 19.3% revealed to be important, 4% were neutral and 2.7% assert irrelevant while 1.3% claimed highly irrelevant to the assertion.

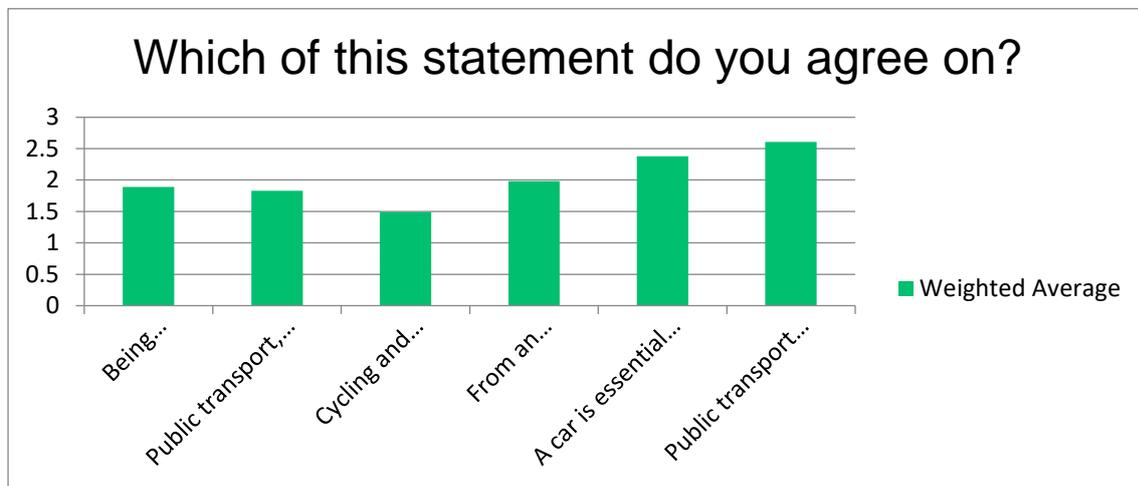
It was observed from the above table in question 8 that 32% of the respondents indicated very important that lack of alternative are important factors in dictating their choice of transport, 27.3% revealed to be important, 32.7% were neutral and 5.3% assert irrelevant while 2.7% claimed highly irrelevant to the assertion.

**Table 4.4 : Which of this statement do you agree on?**

S/NO	Variable	Category	Frequency	%
1.	Being Environmentally responsible is important to me	STRONGLY AGREE	46	30.7
		AGREE	76	50.7
		NEUTRAL	25	16.7
		DISAGREE	1	.7
		STRONGLY DISAGREE	2	1.3
		<b>Total</b>	<b>150</b>	<b>100.0</b>
2.	Public transport, bike sharing, and car sharing are more environmentally friendly than driving a car	STRONGLY AGREE	67	44.7
		AGREE	55	36.7
		NEUTRAL	18	12.0
		DISAGREE	5	3.3
		STRONGLY DISAGREE	5	3.3
		<b>Total</b>	<b>150</b>	<b>100.0</b>
3.	Cycling and walking are more environmentally friendly than driving a car	STRONGLY AGREE	96	64.0
		AGREE	38	25.3
		NEUTRAL	10	6.7
		DISAGREE	4	2.7
		STRONGLY DISAGREE	2	1.3
		<b>Total</b>	<b>150</b>	<b>100.0</b>
4	From an environmental point of	STRONGLY AGREE	57	38.0

	view, it is important we reduce car use	AGREE	53	35.3
		NEUTRAL	25	16.7
		DISAGREE	10	6.7
		STRONGLY DISAGREE	5	3.3
		<b>Total</b>	<b>150</b>	<b>100.0</b>
5.	A car is essential to my needs	STRONGLY AGREE	47	31.3
		AGREE	34	22.7
		NEUTRAL	38	25.3
		DISAGREE	22	14.7
		STRONGLY DISAGREE	9	6
		<b>Total</b>	<b>150</b>	<b>100.0</b>
6.	Public transport is reliable to me	STRONGLY AGREE	16	10.7
		AGREE	65	43.3
		NEUTRAL	34	22.7
		DISAGREE	22	14.7
		STRONGLY DISAGREE	13	8.7
		<b>Total</b>	<b>150</b>	<b>100.0</b>

Source: Field Survey, 2020



**Fig. 9** : Attitude towards traffic, environment, and health

It was observed from the above table in question 1 that 30.7% of the respondents strongly agreed that being environmentally responsible is important to them, 50.7% agreed, 16.7% were neutral and 1.3% disagreed while 1.3% strongly disagreed to the assertion.

It was observed from the above table in question 2 that 45% of the respondents strongly agreed that Public transport, bike sharing and car sharing are more environmentally friendly than driving a car, 36.7% agreed, 12% were neutral 3.3% disagreed while 3.3% also strongly disagreed to the assertion.

It was observed from the above table in question 3 that 64.9% of the respondents strongly agreed that cycling and walking are more environmentally friendly than driving a car, 25.3% agreed, 6.7% were neutral and 1.3% disagreed while 2.7% strongly disagreed to the assertion.

It was observed from the above table in question 4 that 38% of the respondents strongly agreed that from an environmental point of view, it is important they reduce car use, 35.3% agreed, 16.7% were neutral and 6.7% disagreed while 3.3% strongly disagreed to the assertion.

It was observed from the above table in question 5 that 31.3% of the respondents strongly agreed that car is essential to their needs, 22.7% agreed, 25.3% were neutral and 14.7% disagreed while 6% strongly disagreed to the assertion.

It was observed from the above table in question 6 that 10.7% of the respondents strongly agreed that public transport is reliable to them, 43.3% agreed, 22.7% were neutral and 14.7% disagreed while 8.7% strongly disagreed to the assertion.

**Table 4.5 : Rate how effective these transport measures are in promoting the use of sustainable transport?**

S/NO	Variable	Category	Frequency	%
1.	Government policy on reducing car ownership	VERY EFFECTIVE	14	9.3
		FAIRLY EFFECTIVE	22	14.7
		DON'T KNOW	83	55.3
		NOT AT ALL EFFECTIVE	31	20.7
		<b>Total</b>	<b>150</b>	<b>100.0</b>
2.	Government providing incentives to public transport users	VERY EFFECTIVE	35	23.3
		FAIRLY EFFECTIVE	53	35.3
		DON'T KNOW	33	22.0
		NOT AT ALL EFFECTIVE	29	19.3
		<b>Total</b>	<b>150</b>	<b>100.0</b>
3.	Government initiative to introduce more Eco-friendly public buses	VERY EFFECTIVE	45	30.0
		FAIRLY EFFECTIVE	50	33.3
		DON'T KNOW	39	26.0
		NOT AT ALL EFFECTIVE	16	10.7
		<b>Total</b>	<b>150</b>	<b>100.0</b>
4.	More tax on petrol	VERY EFFECTIVE	16	10.7
		FAIRLY EFFECTIVE	34	22.7
		DON'T KNOW	51	34.0
		NOT AT ALL EFFECTIVE	49	32.7
		<b>Total</b>	<b>150</b>	<b>100.0</b>

		<b>Total</b>	<b>150</b>	<b>100.0</b>
5.	cheaper public transport	VERY EFFECTIVE	86	57.3
		FAIRLY EFFECTIVE	27	18.0
		DON'T KNOW	16	10.7
		NOT AT ALL EFFECTIVE	21	14
		<b>Total</b>	<b>150</b>	<b>100.0</b>
6.	More effective and flexible public transport	VERY EFFECTIVE	95	63.3
		FAIRLY EFFECTIVE	29	19.3
		DON'T KNOW	12	8
		NOT AT ALL EFFECTIVE	14	9.3
		<b>Total</b>	<b>150</b>	<b>100.0</b>
7.	More bike sharing and car sharing services	VERY EFFECTIVE	44	29.3
		FAIRLY EFFECTIVE	57	38.0
		DON'T KNOW	34	22.7
		NOT AT ALL EFFECTIVE	15	10.0
		<b>Total</b>	<b>150</b>	<b>100.0</b>

Source: Field Survey, 2020

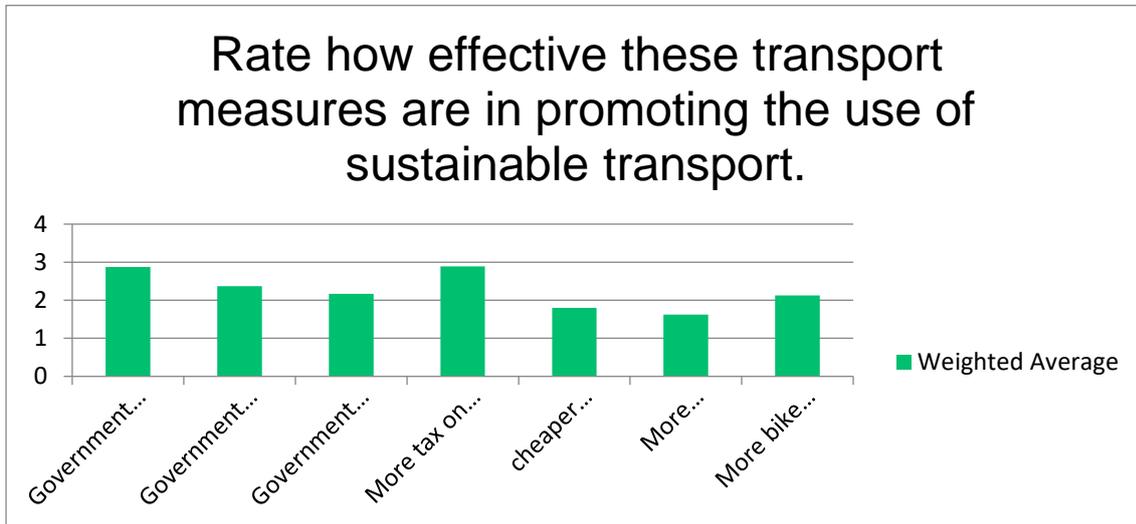


Fig. 10 : Perception of potential effective transport measures

It was observed from the above table in question 1 that 9.3% of the respondents indicated very effective that government policy on reducing car ownership are effective transport measures in promoting the use of sustainable transport, 14.7% were fairly effective, 55.3% claimed they don't know while 20.7% assert not at all effective.

It was observed from the above table in question 2 that 23.3% of the respondents indicated very effective that government providing incentives to public transport users are effective

transport measures in promoting the use of sustainable transport, 35.3% were fairly effective, 22% claimed they don't know while 19.3% assert not at all effective.

It was observed from the above table in question 3 that 30% of the respondents indicated very effective that government initiative to introduce more Eco-friendly public buses are effective transport measures in promoting the use of sustainable transport, 33.3% were fairly effective, 26% claimed they don't know while 10.7% assert not at all effective.

It was observed from the above table in question 4 that 10.7% of the respondents indicated very effective that more tax on petrol are effective transport measures in promoting the use of sustainable transport, 22.7% were fairly effective, 34% claimed they don't know while 32.7% assert not at all effective.

It was observed from the above table in question 5 that 57.3% of the respondents indicated very effective that cheaper public transport are effective transport measures in promoting the use of sustainable transport, 18% were fairly effective, 10.7% claimed they don't know while 14% assert not at all effective.

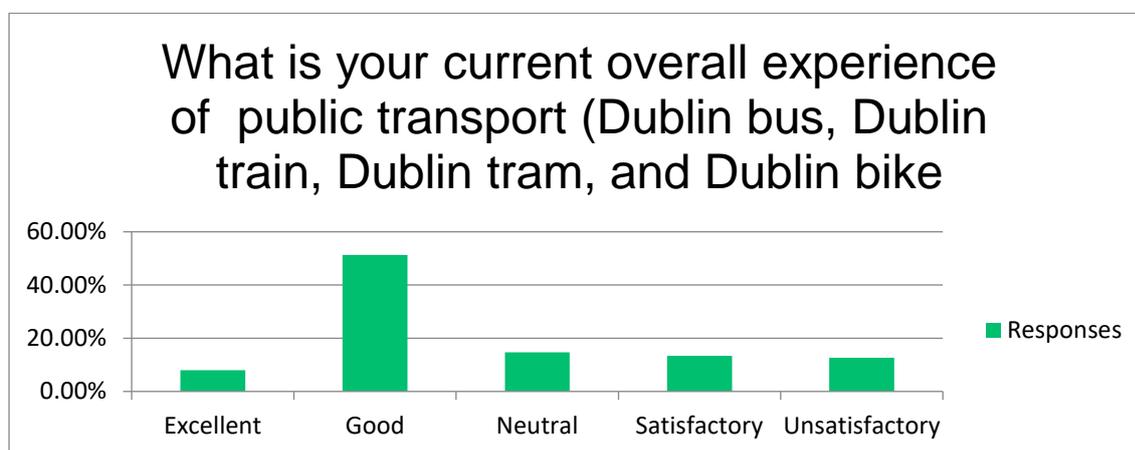
It was observed from the above table in question 6 that 63.3% of the respondents indicated very effective that more effective and flexible public transport are effective transport measures in promoting the use of sustainable transport, 19.3% were fairly effective, 8% claimed they don't know while 9.3% assert not at all effective.

It was observed from the above table in question 7 that 29.3% of the respondents indicated very effective that more bike sharing and car sharing services are effective transport measures in promoting the use of sustainable transport, 38% were fairly effective, 22.7% claimed they don't know while 10% concur not at all effective.

**Table 4.6: Current overall experience of public transport**

S/NO	Variable	Category	Frequency	%
1.	What is your current overall experience of public transport (Dublin bus, Dublin train, Dublin tram, and Dublin bike)	Excellent	12	8.0
		Good	77	51.3
		Neutral	22	14.7
		Satisfactory	20	13.3
		Unsatisfactory	19	12.7
		<b>Total</b>	<b>150</b>	<b>100.0</b>

**Source:** Field Survey, 2020



**Fig. 11 :** Overall experience of public transport

It was observed from the above table that 8% of the respondents indicated excellent about their current overall experience of public transport (Dublin bus, Dublin train, Dublin tram, and Dublin bike), 51.3% were good, 14.7% claimed neutral and 13.3% were satisfactory while 12.7% were unsatisfactory.

### 4.3 TEST OF HYPOTHESES

#### Hypothesis one

**H<sub>01</sub>:** There is no significant effect of environmentally friendly options on sustainable public transportation in Dublin Ireland.

		<b>Correlations</b>	
		Environmentally friendly options	Sustainable public transportation in Dublin Ireland
Environmentally friendly options	Pearson Correlation	1	.782**
	Sig. (2-tailed)		.000
	N	150	150
Sustainable public transportation in Dublin Ireland	Pearson Correlation	.782**	1
	Sig. (2-tailed)	.000	
	N	150	150

\*\* . Correlation is significant at the 0.05 level (2-tailed).

#### Interpretation

The above hypotheses tested revealed that there is significant effect of environmentally friendly options on sustainable public transportation in Dublin Ireland. This was observed at (.782) Pearson correlation value and significant value (.000) Hence, the null hypothesis was rejected while the alternate was accepted. This implies that, as environmentally friendly transportation system increases, sustainable transportation system increases in Dublin Ireland.

#### Hypothesis two

**H<sub>02</sub>:** There is no significant effect of transportation cost on sustainable public transportation in Dublin Ireland.

#### Correlation

		Transportation cost	Sustainable public transportation in Dublin Ireland
Transportation cost	Pearson Correlation	1	.913
	Sig. (2-tailed)		-.005
	N	150	150
Sustainable public transportation in Dublin Ireland	Pearson Correlation	.913	1
	Sig. (2-tailed)	-.005	
	N	150	150

\*\* . Correlation is significant at the 0.05 level (2-tailed).

### Interpretation

The above hypotheses tested revealed that there is negative significant effect of transportation cost on sustainable public transportation in Dublin Ireland. This was observed at (.913) Pearson correlation value and significant value (-.005) Hence, the null hypothesis was rejected while the alternate was accepted. This implies that, as transportation cost reduces, sustainable public transportation in Dublin Ireland increases.

### Hypothesis three

**H<sub>03</sub>:** There is no significant effect of less stressful transport system on sustainable public transportation in Dublin Ireland.

### Correlation

		Less stressful transport system	Sustainable public transportation in Dublin Ireland
Less stressful transport system	Pearson Correlation	1	.515**
	Sig. (2-tailed)		.001
	N	150	150
Sustainable public transportation in Dublin Ireland	Pearson Correlation	.515**	1
	Sig. (2-tailed)	.001	
	N	150	150

\*\* . Correlation is significant at the 0.05 level (2-tailed).

### Interpretation

The above hypotheses tested revealed that there is significant effect of less stressful transport system on sustainable public transportation in Dublin Ireland. This was

observed at (.515) Pearson correlation value and significant value (.001) Hence, the null hypothesis was rejected while the alternate was accepted. This implies that, as less stressful transport system increases, sustainable public transportation in Dublin Ireland increases.

**Hypothesis four**

**Ho4:** There is no significant effect of government policy on sustainable public transportation in Dublin Ireland.

**Correlation**

		Government policy	Sustainable public transportation in Dublin Ireland
Government policy	Pearson Correlation	1	.217**
	Sig. (2-tailed)		.005
	N	150	150
Sustainable public transportation in Dublin Ireland	Pearson Correlation	.217**	1
	Sig. (2-tailed)	.005	
	N	150	150

\*\* . Correlation is significant at the 0.05 level (2-tailed).

**Interpretation**

The above hypotheses tested revealed that there is significant effect of government policy on sustainable public transportation in Dublin Ireland. This was observed at (.217) Pearson correlation value and significant value (.005) Hence, the null hypothesis was rejected while the alternate was accepted. This implies that, as government policy increases, sustainable public transportation in Dublin Ireland increases.

**4.4 DISCUSSION OF FINDINGS**

Taking a critical look at the results collated from the questionnaire administered to commuters in Dublin Ireland, it was observed from the hypothesis one tested that there is positive significant effect of environmentally friendly options on sustainable public transportation in Dublin Ireland. Indeed, this finding can be supported by alluding to the

finding of Akindamola (2018) that interventions to alleviate congestion as well as sustainable transportation system impact on other government policy areas and vice versa. For example, such interventions can impact environmental policy by lowering transport emission levels and improving air quality and road safety policy through improved efficiency and safety of incident responses. They can also positively impact health and well-being as increased use of active travel modes increases physical activity levels and reduced journey times can lower stress levels and improve quality of life. Tax policy can be impacted by reduced revenue from vehicle and fuel taxes/duties caused by reduced private car use. However, demand-focused interventions, such as congestion charging, or tolls can increase tax revenues.

Findings from hypothesis two indicated that there is negative significant effect of transportation cost on sustainable public transportation in Dublin Ireland. This agreed with WCED (2017), that cost is major strategies for sustainable road transport can easily be derived from the broader concept of sustainability. Generally speaking, sustainable development implies meeting the needs of the present generations without compromising the ability of future generations to meet their own needs. He concluded that costs are the basis for all decisions on the transport market. It largely determine both individual mobility demand, and transport supply via rent ability decisions of transport providers or calculations on the economic feasibility of infrastructure projects, etc.

Further finding revealed from hypothesis three that there is positive significant effect of less stressful transport system on sustainable public transportation in Dublin Ireland. This is supported by Akinbola (2017) Information on stress related issues about transportation system can serve as a basis for more rational transport decisions of transport users and suppliers. The choice of transport modes, the acceptance of policy measures and the use of vehicles can be improved through moral suasion and transport-related education.

Further finding revealed from hypothesis four that there is significant effect of government policy on sustainable public transportation in Dublin Ireland. This is supported by Robert, Parris and Lei (2015) that government policy around spatial planning can help towards reducing congestion levels and effective transport system. One of the key priorities of Project Ireland 2040 and the National Planning Framework is compact growth which aims to achieve effective density and consolidation rather than further sprawl of urban development. Achieving this can reduce the need to travel long distance and make sustainable mobility more attractive and easier to supply.

## CHAPTER FIVE

### SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

#### 5.1 SUMMARY OF FINDINGS

The study is divided into five chapters, chapter one focuses on the background information of the study, problem statement, research objectives, research questions, research hypotheses, significance, scope as well as the definition of key terms. Indeed, chapter two reviewed relevant literature by reputable scholars in the area of inquiry. Thus, chapter three focuses on the methodology aspect while chapter four depicts the analysis, interpretations and discussion of findings of information gotten from the respondents through the administered questionnaires. Finally, chapter five will reveal the findings on analysis of data presented in the previous chapter. Indeed, the researcher after analysis and interpretation of questionnaire in the previous chapter, the findings and hereafter conclusion, recommendations and suggestions for further studies shall be stated. Indeed, the findings of the study, conclusions and recommendations will be examined as follows:

- It was observed based on the hypothesis tested in the previous chapter that there is positive significant effect of environmentally friendly options on sustainable public transportation in Dublin Ireland.
- Observation shows that there is negative significant effect of transportation cost on sustainable public transportation in Dublin Ireland.
- Findings from the study depict that there is positive significant effect of less stressful transport system on sustainable public transportation in Dublin Ireland.
- However, result further shows that respondents agreed that more bike sharing and car sharing services are effective transport measures in promoting the use of sustainable transport.

## **5.2 CONCLUSIONS**

The importance of having a sustainable transportation system and some measures that may be considered to achieve the objectives of a sustainable transportation are discussed in this project. However, it is not enough just to learn about the importance and approaches to achieve a sustainable transportation system. A mechanism is needed to determine if the transportation system is progressing towards sustainability. To achieve a sustainable transportation system, it is important that sustainable transportation is comprehensively mentioned in the transportation planning. In addition, there must be an institutional mechanism to implement the sustainable transportation system. Urban land use and transportation planning is integrated which is why organization of urban land use greatly impacts the sustainability of a transportation system. One of the goals of sustainable transportation is to enhance the public transit system and to reduce the usage of personal vehicles. This is why transit system and usage of personal vehicle are important aspects of sustainable urban transportation system. Safety and security is also essential for a transportation system as accidents have socio-economic impact. Transportation is not only about moving people, but it also involves the movement of goods which is why freight transport is another area of sustainable transportation. Transportation is one of the major emitters of CO<sub>2</sub> and other Green House Gas (GHG). As a result, environment is another area of sustainable transportation.

## **5.3 RECOMMENDATIONS**

To achieve maximum benefits of sustainable transport system, the following recommendations are proffered:

- This study recommends that structure should be considered important as any entity interested in sustainable urban transportation system, because it will identify the issues and importance of each areas of sustainable transportation. Then will be able

to learn about the objectives of that particular area of sustainable transportation. After that will also get an overview of some suggested actions and policy considerations to meet the objectives.

- A comprehensive plan should outline the vision, goals and objectives and the approaches that a city can take to have that vision come true. The comprehensive plan should consider transportation planning adequately. It should mention the direction in which the transportation system should be developed. It should identify the future transportation demands and based on that consider sustainable transportation development plans (short-term, medium-term and long-term) that the city may implement to meet those demands.
- Identification of future transportation demands of the city using demographic and other economic and social data on a regular basis.
- Provisions to include sustainable transportation development in the comprehensive plan such as public transit, network of pedestrian sidewalk and bike lanes
- The transportation authority should have the necessary capacity and resources to estimate the present and future transportation demands and consider the appropriate policy decisions that may be taken to meet the existing and future demands.
- Transportation authorities should have qualified staff with the required experience and expertise that are capable of assessing the transportation demands and needs of the people and consider alternative policy actions and their suitability.
- There should be availability of funds to upgrade and replace existing transport systems and to implement future transportation projects to meet the present and future transportation demands.
- The affordability of the transport users is very important for the success and sustainability of a transportation system.

#### **5.4 SUGGESTION FOR FURTHER STUDIES**

This research work focused on commuter's behaviour towards the use of mobility services in driving sustainable transport in greater area of Dublin Ireland. Opportunities for further research still exist in this area. Therefore, further research should be carried out on commuter's behaviour towards the use of mobility services in driving sustainable transport using qualitative techniques. As a researcher, I believe that sustainability is a complex strategy which can sometimes create performance ambiguity within particular settings. Future researcher can try to understand the interest of the government regarding sustainability issues in transportation system and how environmental factors can affect sustainable transport system. Further researchers can conduct a same research in other different countries (cross-country) in order to compare their findings with our findings.

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## APPENDIX

### Appendix A

## QUESTIONNAIRE

### Section A Respondent Demographic information

1 **Gender:** Male ( ) Female ( )

2 **age :** 18-24 ( ) 25-34 ( ) 35 – 44 ( ) 45-54 ( ) 55 and above ( )

4 **Work Status:** Unemployed ( ) Employed ( ) Student ( ) Self Employed( ) Retired ( )

### Section B Travel behaviour

1 **Mode of Transportation (daily basis) :** Car (driver/passenger) ( ) Public transport (bus/ train/ tram) ( ) Bicycle ( ) Walk ( ) Combine( e.g public transport then Bicycle)

2 **Car use frequency :** Never ( ) 1 – 3 times per month ( ) 1 – 2 time in a week ( ) 3 – 4 times a week ( ) 5 or more times per week ( )

3 **Bicycle user:** No ( ) Yes ( )

### Rate how important the following factors are in dictating your choice of transport

Highly Irrelevant = **HI** Irrelevant = **IR** Neutral = **N** Important = **I** Very Important = **VI**

SN	Statement	VI	I	N	IR	HI
1	Environmental benefit					
2	cost					
3	flexibility					
4	convenience					
5	Reliability					

### C Respondents Attitude towards traffic, environment, and health

Strongly Disagree = **SD** Disagree = **D** Neutral = **N** Agree = **A** Strongly Agree = **SA**

SN	Statement	SD	D	N	A	SA
1	Being environmentally responsible is important to me					

2	Public transport, bike sharing, and car sharing are more environmentally friendly than driving a car					
3	Cycling and walking are more environmentally friendly than driving car					
4	From an environmental point of view, it is important we reduce car use					
5	A car is essential to my needs					
6	Public transport service is reliable to me					

**Section D Respondents Perception of potential effective transport measures**

Not at all effective = **NE** don't Know = **DK** fairly effective = **FE** Very effective = **VE**

SN	Statement	NE	DK	FE	VE
1	Government policy of reducing car ownership				
2	Government providing incentives to public transport users				
3	Government initiative to introduce more green public buses				
4	More tax on petrol				
5	Cheaper public Transport				
6	More efficient and flexible public transport				
7	More Bike sharing and car sharing services				

**Current overall experience of public Transport( Dublin bus, Dublin train, Dublin tram and Dublin bike) :** Unsatisfactory ( ) satisfactory ( ) Neutral ( ) Good ( ) Excellent ( )

**Appendix B**

**INFORMATION SHEET FOR Participants**

**Research project title:** commuters' behavior towards the use of Mobility Services in driving sustainable transport. Case study Ireland (Greater area of Dublin).

**Student Researcher:** Ademola Olatunji Mayowa **Email:** olatunjiademola30@gmail.com

**Research Supervisor:** Cathal Coleman

### **About the Project**

My name is Ademola Olatunji and I am a master's student at Dublin Business School, Ireland. As part of the requirement for the completion of my course, I am conducting this research project under the supervision of Cathal Coleman on the subject of sustainable transport and impact of commuters' behaviors and preferences.

The aim of this research is to measure the acceptance level of mobility services and behavioural impact and traveling preference of commuters in Ireland specifically in the greater area of Dublin.

I would like to invite you to take part in a questionnaire and recorded interview.

As a participant in the study you would be required to answer questions about your travel behavior, attitudes towards traffic, environment and health and possible intention to reduce car use.

### **Data Protection**

The data you provide as part of this questionnaire/experiment will be fully anonymous. I will not gather any direct personally identifying information about you or anyone close to you. You will be asked to provide optional demographic information of a broad nature about yourself. Your data will be collated into a larger dataset and analyzed at the group rather than the individual level. Your data will only be used for academic purposes and will not be shared with anyone for commercial purposes.

Interviews will be recorded for the sole purpose of facilitating later transcription of the data. Precise transcripts are important in research to ensure that data is recorded accurately, to allow the interviewer to be more present in the conversation and, importantly, to support greater accountability and scientific integrity. During the transcription phase your data will undergo de-identification involving the removal of all personally identifying information thereby rendering them anonymous for retention. The original recordings will be digitized and kept under password protection. Upon graduation all recordings will be permanently deleted. Your data will be used strictly for academic purposes and will not be shared with used or shared with anyone for commercial purposes. The researcher will adhere to strict ethical guidelines and principles and will not anecdotally share any personally identifying information about you with anyone.

### **What are the risks and benefits of taking part in this study?**

In addition to providing much appreciated assistance to the student researcher, the main benefit of taking part in this study will be your contribution to academic research, which aims to expand knowledge and generate new insights. There will be no risks posed to you as a participant in this study, either physical or psychological, beyond that which is normally expected of day-to-day activities.

**If you are interested in taking part...**

If you are interested in taking part please review the information provided in the consent form and if you are happy to proceed with the study then please indicate your willingness to take part by ticking the appropriate box / signing your name where appropriate.

You are under no obligation to take part in this study or to provide a reason if you decide not to take part. You may choose not to take part without fear of penalty. If you agree to take part you have the right to cease participation and withdraw your data at any time for any reason without fear of penalty. The data will not be used by any member of the project team for commercial purposes.

**Appendix C**

**Consent Form**

I \_\_\_\_\_ voluntarily agree to take part in this research study.

I understand that I am not obliged to take part in this study and that my participation in the study is entirely voluntary.

I understand that I am free to withdraw from the study at any time or refuse to answer any question without the need to provide reason and without fear of negative consequences.

I understand that my responses will be anonymous

I understand that in the case of completing an anonymous questionnaire, it will not be possible to subsequently withdraw my data due to the fact that there will be no personally identifying information attached to my responses.

I understand that digital recordings will be stored under password protection for some time until the approval of their dissertation by the examination board, at which point recordings will be permanently deleted.

I understand that my data will undergo de-identification during transcription and will be rendered anonymous for retention and for the purpose of subsequent publications.

I understand that I can withdraw permission to use data from my interview within two weeks after the interview, in which case the material will be deleted.

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Name & Signature of research participant

Date

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Name & Signature of researcher

Date