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Research Article

Accessibility as an indicator of transport equity. The case of public transport infrastructure in Malta, and its impact on the elderly

Thérèse Bajada*[1], Deborah Mifsud[1], Floridea Di Ciommo[2]
[1]*Institute for Climate Change and Sustainable Development, Regional Business Centre, Ground Floor, Msida Heights, University of Malta*
[2]*CENIT-Center for Innovation in Transport UPC-Barcelona Tech C. Jordi Girona, 1-3, Building C3-S120 08034 Barcelona*

Abstract. The concept of equity is essential in transport because inequities lead to the formation of transport-disadvantaged groups, such as the elderly, disabled and low-income people. This paper focuses on the elderly. Due to age-related circumstances, several elderly persons have to surrender on driving, consequently they become highly dependent on public transport. Hence, accessible public transport is crucial to provide them with the necessary mobility. This research considers accessibility as a key indicator for transport equity, since the latter primarily deals with the provision of equal access to opportunities. The study focuses on the case of Malta's public transport system, which is composed of the bus service. The uniqueness of the Maltese case is that transport policy is fragmented, and is not focused on equity. This paper looks at three aspects of accessibility related to road infrastructure, public transport infrastructure, and the bus fleet. The first aspect refers to accessibility at the macro scale, for instance, pavements may not be solely designed to cater for the bus service, but they are an integrative part of it. The meso scale refers to accessibility of infrastructure in physical and cyber form, such as access to and on bus stops and access to online travel information. The bus fleet refers to the micro scale of accessibility, which may include boarding and alighting the vehicle, and access on the vehicle. The research approach involves a review of existing Maltese public transport policy, with specific focus on whether accessibility for the elderly is considered in the context of the afore-mentioned scales. It is envisaged that the minimal or non-existent policy on accessibility in public transport that focuses on elderly, makes this population segment at a double disadvantage. The research concludes with implications for policy related to public transport accessibility in a Maltese ageing society.

Keywords: transport equity, accessibility, public transport infrastructure, elderly people, transport policies for elderly, Malta

1 Introduction

Accessibility refers to the ability of reaching goods, services, and destinations. It is linked with mobility, which provides the opportunity for people to move from an origin to a destination (Litman, 2016). Hence, accessibility and mobility are two interdependent concepts that encourage independent living (Suen & Mitchell, 2000).

Accessibility is a necessity for people to reach their destinations, whether they are daily commuters or not. A non-commuting group is the elderly population. Due to age-related circumstances, several elderly persons have to surrender on driving, consequently they become highly dependent on public transport (Whelan, Langford, Oxley, Koppel & Charlton, 2006). This is one reason why elderly are one of the transport disadvantaged groups in society (Wixey, Jones, Lucas & Aldridge, 2005). In fact, older people use public transport more than younger generations (Goodwin & Lyons, 2010).

Hence, equity is essential in public transport because it ensures that the population segments that are at a disadvantage are provided with the same opportunities as other population segments. In fact, the concept of transport equity is built upon connecting citizens to key activity destinations by means of public and private transport infrastructure (Di Ciommo & Lucas, 2014). Consequently, it is necessary to include the assessment

**Correspondence to*: Thérèse Bajada (therese.bajada@um.edu.mt)

of equity as part of the monitoring programme of a bus service. Two important factors that are used to gauge equity are accessibility and mobility (Litman, 2016).

This research focuses in particular on public transport accessibility as a key indicator for transport equity. It seeks to identify the availability of transport policy on different levels of the bus system's infrastructural accessibility. The first level refers to accessibility at the macro scale, for instance, pavements may not be solely designed to cater for the bus service, but they are an integrative part of it. The meso scale refers to accessibility of infrastructure in physical and cyber form, such as access to and on bus stops and access to online travel information. The bus fleet refers to the micro scale of accessibility, which may include boarding and alighting the vehicle, and access on the vehicle.

The case study is Malta's public transport system, namely the bus service. Hence, the premise for this research is that an accessible bus service is crucial to provide the elderly with the necessary mobility that retains their independence.

The Maltese case provides the opportunity to explore a fragmented transport policy in which equity is not at the top of the policy agenda. This makes the elderly segment at a double disadvantage. The paper concludes with implications for policy related to public transport accessibility in a Maltese ageing society.

Malta has several geo-demographic characteristics that make it a good candidate to have high public transport patronage. However, it is not the case as the modal split is 75 per cent car users and 15 per cent bus users (Transport Malta, 2010). Such factors include a population of 0.4 of a million residing on a land area of only 316 km^2, one of the highest population densities in the EU (1,317 persons per km^2). Moreover, with particular relevance to this paper, Malta has an ageing population that is increasing at a fast rate. For the first time in history the 65+ age group in Malta is exceeding the 0–14 age group (1901: 0–14 age group - 34.1%, 65+ age group - 5.4%; 2012: 0–14 age group 14.5%, 65+ age group - 17.2%) (National Commission for Active Ageing, 2013). Fig. 1 illustrates the distribution of the elderly population in Malta in 2011. The Northern Harbour District, followed by the Southern Harbour District has the highest elderly population. Malta's conurbation is found in these districts.

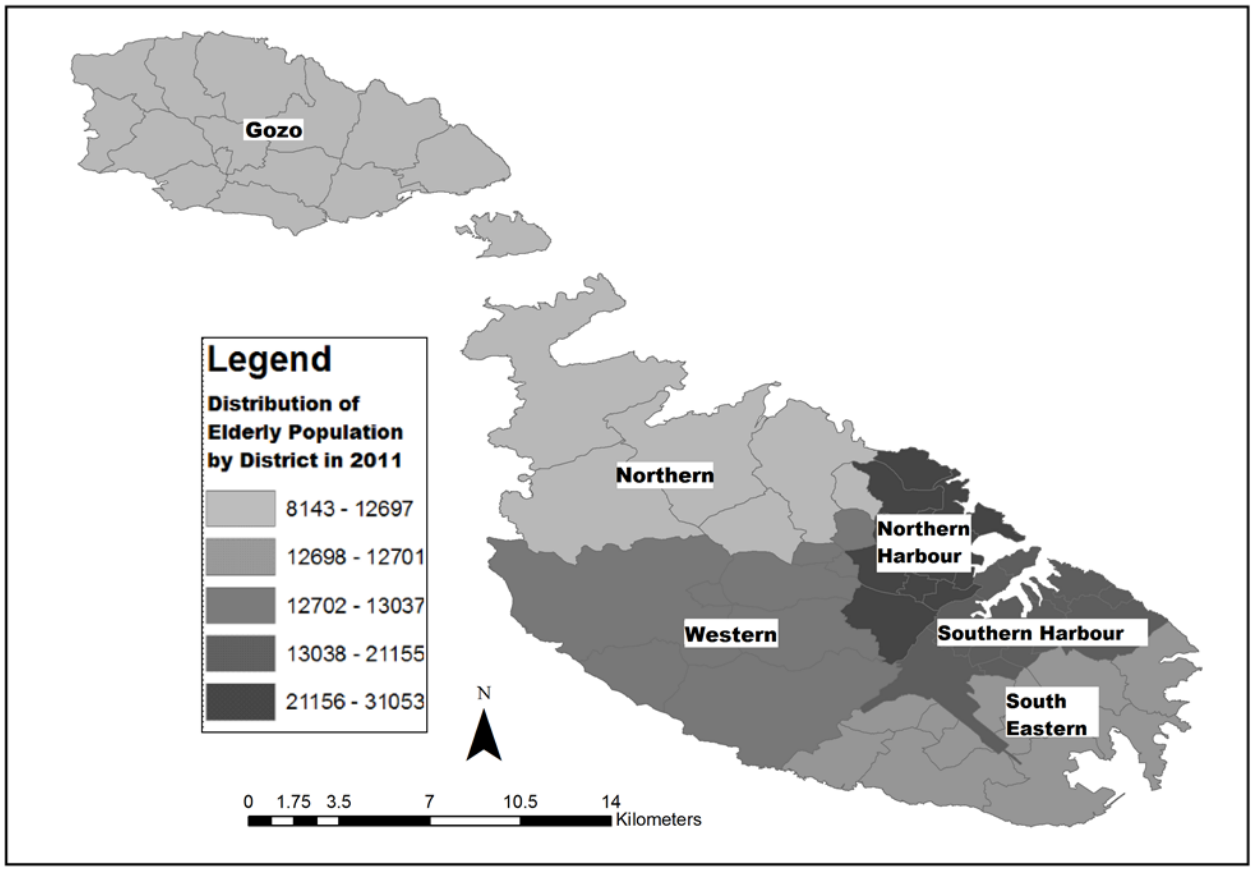

Figure 1: Map of Malta indicating the distribution of the Elderly Population by District in 2011 (Adapted from National Statistics Office, 2012a).

The paper is organised in five sections. Following this introduction, the second section provides a background literature review on transport equity in the context of elderly people as a socially excluded group, and referring in particular to work on accessibility. Section three provides an overview of the case study, the bus service in Malta. Section four explores the evaluation of Maltese transport policy in the context of elderly people and accessibility related to bus use. The fifth section provides the discussion and conclusion in view of land transport policy in Malta that relates to evaluation discussed in section four.

2 Literature Review

The concept of equity in transport research is relatively new (Trinder, Hay, Dignan, Else & Skorupski, 1991; Banister, 2000; Lucas, 2006; Martens, 2006; Mavoa, Witten, McCreanor & O'Sullivan, 2012). It has been classified into two dimensions. The first one is 'horizontal equity', which refers to an equal distribution of resources between individuals; and the second one is 'vertical equity', whereby resources are distributed according to similar abilities and needs (Litman, 2016; COST, 2012; Martens, Golub & Robinson, 2012). This study refers to 'vertical equity', because it focuses on elderly people who are a segment of the population with the same capabilities and requirements.

2.1 Transport Equity

Transport equity is considered as a way of providing social justice (Martens, 2006), and where transport equity is missing in terms of transport distribution, social exclusion takes place (Lucas, 2012). Factors that are used to gauge equity in public transport are system reliability, environmental impact (Bocarejo S. & Oviedo H., 2012), and accessibility, which affects the opportunities and capabilities of individuals to use the bus (Litman, 2016). This research focuses solely on accessibility because it is an important factor for elderly persons, since an inaccessible bus service impairs their mobility (Hanson & Giuliano, 2004).

2.2 The elderly as a socially excluded group

Older people who use public transport can become socially excluded due to limitations regarding the choice of other modes. Restricting factors include: age, income or lack of access to private transport (Beimborn, Greenwald & Jin, 2003).

Opportunities for various demographic groups are often reduced due to a reduction in accessibility, affordability and availability of transport (Church, Frost & Sullivan, 2000; Sen, 2000; Wixey et al., 2005). Elderly women tend to suffer more than men as they are more likely to spend more time relying on public transport after retirement (Foley, Heimovitz, Guralnik & Brock, 2002; Stutts, Wilkins, Reinfurt, Rodgman & Van Heusen-Causey, 2001).

2.3 Elderly and public transport accessibility

Social injustice is experienced when, for example, elderly people suffer from difficulties in mobility and feel insecure while waiting for the bus (Dunbar, Holland & Maylor, 2004). Such problems lead to inaccessibility, which hinders the quality of life of elderly people (Peel, Westmoreland & Steinberg, 2002; Hess, 2009; Frye, 2012). This can lead to social isolation, depression, and general health deterioration (Marottoli et al., 1997; Victor, Scambler, Bowling & Bond, 2005; Siren & Hakamies-Blomqvist, 2009). Hence, in an ageing country like Malta, it is important to consider and plan for equity in the public transport system, and gauge equity through factors such as transport accessibility.

Accessibility can be measured using different factors. The first factor is infrastructure accessibility. Pedestrians require accessible walkways, suitable traffic signals and street crossings (Suen & Mitchell, 2000). Older persons appreciate an accessible walking environment with pedestrian crossings and signs, much more than younger adults. They are more cautious and try to avoid crossing roads without pedestrian facilities (Bernhoft & Carstensen, 2008).

Additionally, accessibility comprises the ability to move from one bus stop to another, within a specific timeframe, particularly if a person is interchanging from one mode to another. In fact, the distance to bus stop, waiting time and ease of transfers are major factors that attract elderly persons to use public transport (Wardman, 2001). Since people in public transport services often cite the elderly population as one of the major rider segments (Carr, 2003) it is important that such infrastructure is suitable to accommodate the elderly.

Another key concept is knowledge. Bus users must be well-informed about the service before scheduling a trip, such as knowing the location of the bus stop and travel times (Beimborn et al., 2003). Information can attract more people to use public transport (Beirão & Sarsfield Cabral, 2007). A study carried out in Luqa, Malta, identified that lack of information was one of the factors that hindered elderly persons from using the bus service (Mifsud, 2013).

Moreover, people should find it easy to board on and off the vehicle (Beimborn et al., 2003); particularly old persons who generally suffer from health problems such as, arthritis, rheumatism and cardiac conditions (Smith, 2001). In Nigeria, 46 per cent of the transport constraints for elderly were related to boarding problems and inappropriate vehicle conditions (Olawole & Aloba, 2014), such as absence of low floor buses (Wixey et al., 2005). The feelings of resentment from other passengers if old persons take too long to access the vehicle are an-

other common problem that elderly people face when using public transport (Wixey et al., 2005).

2.4 Polices on Transport Equity

Different countries have adopted various policies and programmes related to elderly mobility and accessibility. In the United States equity in public transport provision is required by the legislation SAFETEA[1] (Delbosc & Currie, 2011).

The ECMT[2] has identified these main policy areas: ensure an accessible mobility environment and legislative reforms that address elderly transport issues, such as improving accessibility to public transport (European Conference of Ministers of Transport Council of Ministers, 2003), and monitoring the progress of accessibility policies (European Conference of Ministers of Transport Council of Ministers, 2006). Moreover, the European Commission (2011) acknowledges the difficulties that elderly persons encounter in their walking environment, and highlights the need to improve the accessibility of transport infrastructure for elderly and disabled passengers.

The current generation of elderly people is healthier than prior ones, and they have a more mobile lifestyle. However, there is still need to focus policies on the ageing population. Such policies are often lacking, as often only short-term goals of transport are considered. In Ontario (Canada), for instance, the ageing population is not even considered in transport policies on long-term basis (Mercado, Páez & Newbold, 2010). This is due to political and economic bias. Priority is given to economic and environmental issues, leaving the ageing population perspective behind. Additionally, most transport policies for elderly people are just related to private cars (example, screening drivers to analyse whether they should stop driving) (Mercado, Paéz, Scott, Newbold & Kanaroglou, 2007).

Furthermore, most of the current policies related to elderly in the transport environment are just concerned with disability aspects. In Ontario, the AODA[3] published in 2005, aims that by 2025 the province's infrastructure is accessible to elderly with impairments. Transport policies should go beyond limiting the elderly within the policy framework of disabled persons (Mercado et al., 2010). In fact, developed countries, which take primarily into consideration the needs of the elderly population, such as Japan serve the general public better. However, when referring to a public transport service one needs to consider the particular context and necessities of the country (Mercado et al., 2007).

In 2013, Malta launched *The National Strategic Policy for Active Ageing* 2014–2020 (National Commission for Active Ageing, 2013). This shows how lack of access often leads to social exclusion. Unfortunately, although the policy tackles independent living amongst the elderly, the transport dimension is not given detailed consideration. Hence, although Malta has a projected increase in the elderly population, it is clear that more national plans dealing with this population segment's transport necessities are lacking. Therefore, in 2012 the University of Malta joined the Transport Equity Analysis: assessment and integration of equity criteria in transportation planning (TEA) Cost Action №1209 to acquire an understanding on the equity implications of transport policies. This is a positive step in the interest of increasing awareness about equity in transport policy.

2.4.1 The need for stakeholder involvement

There is the need for integrating various stakeholders in order to have a more inclusive approach in transport policy (Smith, 2001; Mercado et al., 2010). For instance, an accessible walkable environment is both a transport and a health concern. Therefore, links between health and transport institutions should be accentuated.

This means that transport policies should take into consideration a holistic approach of the older persons' necessities that comprise their lifestyles, health, and physical abilities. They should support an integrated mobility approach. If all the laws are in place and the concerned institutions are interrelated, they can contribute to secure consistency in policy directions and trigger accessibility innovations. A comprehensive literature review has recently been finalised as part of one of the milestones of the TEA Cost Action (Bastiaanssen, Lucas & Martens, 2014) that refers to the inclusion of accessibility in equity appraisal. Reference to this work can lead to new ideas on how to evaluate and improve equity in the field of transport.

3 The Case Study of the Bus Service in Malta

The Malta bus service has gone through radical changes in the past three years. Table 1 shows the timeline of the bus service until January 2014.[4] Following nationalisation of the bus service, the Maltese government has issued an expression of interest to find a new operator.

Although the bus service reform failed in achieving modal shift, it led to the improvement of some bus service quality characteristics. Such achievements were acquired through the onerous service level agreement that was included in the contract.

[1] Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

[2] European Conference of Ministers of Transport

[3] Accessibility for Ontarians Disability Act

[4] This research was carried out in 2014.

Table 1: Timeline of events related to the bus service in Malta.

Month/July	Description
2008	A policy document entitled "Public Transport in Malta: A vision for Public Transport which fulfils public interest in the context of environmental sustainability" (Ministry of Infrastructure Transport and Communications, 2008), paved the way for the bus service reform.
Pre-July 2011	Bus services provided by the Public Transport Association, comprised by 400 bus owners/drivers, operated under the form of a monopoly.
July 2011	Commencement of the bus service reform.
December 2013	"Arriva Malta" bowed out of the country.
January 2014	Bus service nationalised.

3.1 Bus Service Quality Characteristics

An increase in bus patronage means that customers are satisfied (Eboli & Mazzulla, 2007). The bus service quality characteristics that improved after the reform were comfort, fare, and customer care (Attard, 2013). Infrastructural changes included low kerbsides in some areas where there are main bus stops, tactile surfaces, and low floor buses. These improvements were important milestones that made the bus service better, at least for those users who have no other mode of transport available. The factors that need immediate improvement are punctuality related issues (Attard, 2013).

3.2 Effects of the Malta bus service on the elderly

An increase in longevity allows the elderly generation to have a more mobile lifestyle (Alsnih & Hensher, 2003; Banister & Bowling, 2004). In a decade (between 2001 and 2011), Malta witnessed an increase of 19,279 driving licence holders for people aged 60 years and more (National Statistics Office, 2012b).

Yet, the elderly population still represents the highest number of bus users. When compared to other age groups, a minimal distinction between males and females using the bus service is found in older people (Transport Malta, 2010). Since 2011, The Public Transport Customer Satisfaction Survey (Institute for Climate Change and Sustainable Development, 2013) shows that the majority of the frequent elderly bus users are actually non-car owners; hence, as seen in other cases, such as Portland, Oregon, they are potential captive bus users (Beimborn et al., 2003).

Elderly bus users appreciate customer care assistance, fare structure (value for money), and comfort (Institute for Climate Change and Sustainable Development, 2013; Mifsud, 2013). Users also rated positively accessibility in terms of low-floor buses (Mifsud, 2013), which is convenient for elderly persons as seen in cases around Europe and North America (Suen & Mitchell, 2000).

In Malta, negative factors include unreliability, inaccessible and out-dated travel information, lack of safety, fear to travel alone, low frequency of services, and inappropriate bus driver travel behaviour (Institute for Climate Change and Sustainable Development, 2013). Despite the fact that the elderly travel mostly for medical issues and errands, the temporal accessibility to reach Malta's general hospital is still not sufficient, as all the desired time budgets of the elderly are exceeded (Mifsud, 2013).

The time ratio between bus use and car use is significant when considering the locations where elderly people reside and their travel destination. In a study in Madrid, it has been identified that in the congested section of the M40 the travel time ratio of public transport and car is on average 1.62 (Di Ciommo & Lucas, 2014). Thus, the long journeys associated with bus use contribute more to social exclusion, in this case when elderly find it more difficult because of time issues to reach their destinations.

Moreover, elderly persons are well concerned about the inappropriate distribution of bus stops, which does not cater for their needs. Inaccessibility to bus stops is also expressed through difficulties in crossing roads that have high traffic volumes.

4 Maltese Transport Policy

The Structure Plan of the Maltese Islands (Buchanan, 1990) is one of the earliest policy documents that looks holistically at land-use planning policies, including land transport (Buchanan, 1990, Section 14). The policies refer particularly to the land transport matters listed in Table 2.

Table 2: Land Transport Policies referred to in the Structure Plan (Buchanan, 1990)

Land Transport Policies referred to in the Structure Plan (1990)
Development and maintenance of a hierarchical network of roads
Traffic and environmental management
Public transport
Legal and educational measures

Over the past twenty-four years, implementation of these policies was restricted since the aim of this document was to provide a larger planning vision for Malta. Additionally, organisational fragmentation contributes to a disjointed transport policy (Attard, 2005) that is divided between the Planning Authority (PA), Transport Malta (TM) and the Ministry of Transport. Hence, an update of the Structure Plan was long overdue.

The SPED[5] has been issued for public consultation in March 2014 (Malta Environment and Planning Authority, 2014), and is the follow up to the Structure Plan (Buchanan, 1990). The issues related to transport are reported as key issues under the section Travel Patterns (Malta Environment and Planning Authority, 2014, p. 13). They echo the same problems discussed in the original Structure Plan and refer to the white paper that triggered the bus service reform (Ministry of Infrastructure Transport and Communications, 2008).

In fact, the white paper (Ministry of Infrastructure Transport and Communications, 2008) is the only policy document that is directly related to public transport in Malta. Additionally, TM had issued the Accessible Public Transport Infrastructure Policy, Design Guide (Transport Malta, 2009).

The following section discusses these three policy documents in terms of the three different scales of accessibility discussed in Section 1: the macro scale, meso scale and the micro scale. The initial observation when looking at the three policy documents is the absence to the reference of social equity when discussing land transport policy.

4.1 A Methodological Approach: The Three Scales of Accessibility

The structure plan refers to the configuration of the road network as the major criterion that affects the accessibility level (Buchanan, 1990). It focuses on the arterial and distributor road network that forms the main roads in Malta, and link the urban and rural areas.

Apart from this focus, the structure plan mentions the elements listed in Table 2. With the exception of the improvement of public transport, the other elements influence indirectly the bus system since it operates on this road network.

Hence, the policies that reflect these elements affect the bus service and its accessibility. Table 3 shows the policies related to both the macro scale and the meso scale. The macro scale is the shared infrastructure between the public transport system and the road network, as found in the Structure Plan of the Maltese Islands (Buchanan, 1990).

The meso scale refers to infrastructure, both physical and online, that is directly related to the bus system. The physical form is referred to in the Structure Plan (Buchanan, 1990) and in the Accessible Infrastructure for Public Transport Policy Design Guide (Transport Malta, 2009). The cyber form is mentioned briefly in the white paper (Ministry of Infrastructure Transport and Communications, 2008), stating that information technology should be applied at all levels, and give more facilities and information to the public. Although this provides more accessibility, it fails to address equity, and direct access to elderly people. In a world where elderly people are becoming more capable of using technology that aids in increasing accessibility (Mikkonen, Vayrynen, Ikonen & Heikkila, 2002), this concept is even more important to integrate in a transport system that provides services to the elderly. The importance of this is related to the possibility of increasing opportunities and abilities to elderly persons (Geurs & van Wee, 2004).

Table 3 also shows the inclusion of road transport policy that is at the meso scale. All the references made to the meso scale are generic policies that fail to address accessibility for elderly persons. The main barriers related to developing further such transport policies are linked to lack of proper and accurate information; there is a deficiency in transfer of knowledge that is related to a small number of transport professionals in Malta. Another issue arises from the two-party political situation, so politicians do not embrace projects that impose a cost on the population, because the projects may influence whether they are elected in the next legislation. Another issue arises from the lack of infrastructural and professional investment in public transport operations (Attard, 2005).

Micro scale accessibility refers to the ability to move easily when boarding and alighting the bus and on the vehicle itself. The policy documents mentioned in Table 3 do not mention in detail the requirements for an accessible service. However, the service level agreement signed in the contract (Transport Malta, 2009) specifically required low floor buses that are easily accessible by vulnerable groups of society, such as elderly persons.

5 Discussion and Conclusion

This research shows that in Malta land transport policy is limited (Attard, 2005) and public transport policy is even more restrained. Some examples include deficiencies in waiting time conditions and interchanging facilities that increase accessibility to elderly persons. Moreover, policy is fragmented between different institutions within government, namely PA (Buchanan, 1990), TM (Transport Malta, 2009) and the Ministry of Transport (Ministry of Infrastructure Transport and Communications, 2008). This fragmentation leads to a lack of detail in land transport policy that focuses particularly on public transport and on the availability of

[5]Strategic Plan for Environment and Development

Table 3: Policy Documents that address the Macro and Meso Scale of Public Transport in Malta.

	Scales			
	Macro		Meso	
Policy Document	Policy	Comment	Policy	Comment
Structure Plan of the Maltese Islands	**TRA3:** During the time that urban development takes place, developers are subject to fund necessary remedial road works. **RDS7:** The extension of pedestrian priority and access only restrictions in UCAs (Urban Conservation Areas), including areas suffering from the environmental impact of traffic. **TEM1:** Design of traffic management will conform to agreed standards for road design and construction.	There is no specification to accessibility or equity, and such works tend to be temporary, which might imply that provision of necessities that cater for vulnerable groups of society might not be implemented. Elderly people require pedestrian priority, because they have to walk to reach the nearest bus stop. Moreover, UCAs are the core of urban areas, where generally elderly people live. This policy focuses on the benefit of the environment but fails to address the element of equity. The design guide for public transport infrastructure was only prepared nineteen years later. During these years, as still happens with road infrastructure, the designs are known and adapted by road engineers, and knowledge is transferred from one person to the other. This leads to the possibility of omitting equity measures that could improve, amongst other factors, accessibility for the elderly.	**TEM7:** Bus priority lanes and other priority measures in locations where they are feasible, and where the time and cost savings to the bus operators and passengers exceed the equivalent delays to other road traffic. **PTR2:** Appropriate bus fleet for the narrow road types. **PTR3:** Studies that minimise interchange. **PTR5:** Efficient intermodal interchanges. **PTR7:** Smaller bus terminus in Valletta, the Capital City and main hub of the bus service. **PTR8:** Better accessibility during and after operations of major developments. **PTR9:** Improved waiting conditions with reliable passenger information on shelters at bus stops.	All these policies are generic and address accessibility without going into detail of usage for elderly persons, hence omitting the concept of equity particularly for vulnerable groups.
Public Transport in Malta: A Vision for Public Transport which fulfils public interest in the context of environmental sustainability	N/A	N/A	Addressed inter-modal accessibility, new bus fleet, express and regular bus service, a service that caters for peripheral destinations, and night services, discount schemes for frequent users, and provision of information technology services.	These factors were mentioned briefly and there were no policies that referred particularly to each point, and even more so that addressed equity to vulnerable groups.
Accessible Public Transport Infrastructure Policy, Design Guide	N/A	N/A	Details specifications and measurements for the design of bus stop signs and information signs, bus stop and bus shelter designs, including kerb dimensions and bus priority dimensions. It follows the framework of national accessibility guidelines for disabled persons	It primarily focuses on infrastructure design it does not refer directly to usage of the infrastructure by elderly persons.

public transport to elderly people.

In Malta it is necessary to focus more on land transport policy making. There is the need of having an integrated approach to the formulation of land transport policy. Policy should directly address equity and vulnerable groups in society, including elderly persons. This can be done by providing additional policy documents and guidelines to the existing documents. This measure would allow more focus that is direct on equity issues, such as long walking distances to bus stops, which could be identified by using time ratios (Di Ciommo & Lucas, 2014).

However, the SPED (Malta Environment and Planning Authority, 2014) does not seem to address these issues. It builds upon the Structure Plan (Buchanan, 1990) and refers to the public transport policy document (Ministry of Infrastructure Transport and Communications, 2008). The objectives for transport and public transport reproduce the objectives of these two documents, and there is limited direct addressing to accessibility in general and for the elderly.

Meanwhile, TM is in the process of designing the National Transport Strategy and Transport Master Plan. This process is still in its early stages; TM is proposing that an SEA is undertaken as part of the development of the master plan (Transport Malta, 2014). This will allow for the evaluation of policy within the transport framework. Consequently, it is essential that at this stage the relevant stakeholders meet to discuss the needs for improving accessibility to elderly persons and address transport equity issues.

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