



Delft University of Technology

The added value of having multiple options to travel to. An explorative study

del Mar Parra López, María; Annema, Jan Anne; van Wee, Bert

DOI

[10.1016/j.jtrangeo.2021.103258](https://doi.org/10.1016/j.jtrangeo.2021.103258)

Publication date

2021

Document Version

Final published version

Published in

Journal of Transport Geography

Citation (APA)

del Mar Parra López, M., Annema, J. A., & van Wee, B. (2021). The added value of having multiple options to travel to. An explorative study. *Journal of Transport Geography*, 98, Article 103258. <https://doi.org/10.1016/j.jtrangeo.2021.103258>

Important note

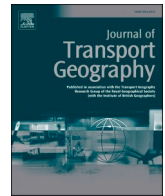
To cite this publication, please use the final published version (if applicable). Please check the document version above.

Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights. We will remove access to the work immediately and investigate your claim.



The added value of having multiple options to travel to. An explorative study

María del Mar Parra López^{a,1}, Jan Anne Annema^b, Bert van Wee^{b,*}

^a Graduated MSc student Management of Technology, Delft University of Technology, the Netherlands

^b Transport and Logistics Group, Faculty Technology, Policy and Management, Delft University of Technology, Jaffalaan 5, 2628 BX Delft, the Netherlands

ARTICLE INFO

Keywords:

Accessibility

Value

Option values

Willingness-to-pay

ABSTRACT

The economic valuation for different accessibility levels is still an unexplored topic in the field of urban and transport planning. This paper is an exploratory study that aims to quantitatively assess the added value of having multiple options of the same destination available to travel to. A two-phase methodology is proposed based on two different questionnaires. The first phase consists of an explorative questionnaire that helped to narrow the research to two final destinations: medical centres and kindergartens. The second phase is based on the contingent valuation method payment cards, obtaining willingness to pay (WTP) values for different hypothetical situations. A first conclusion is that the value of having multiple options available varies between types of destinations. For basic services this value is motivated by non-use and option values, for non-basic services use values dominate. Secondly, in the case of kindergartens, users and option users have higher a WPT than non-users. For medical centres there is no statistically significant difference between these groups. Third, we did not find a statistical significant impact of demographic variables on WPT values. Fourth, sometimes, it is not only the number of options itself what people appreciate. Many other factors relevant for this appreciation also play a role, examples being the capacity of current destinations or particular characteristics of the destination being valued, especially in the case of non-public destinations.

1. Introduction

For decades, in many countries improving accessibility has been one of the main objectives for policymakers in the field of transport and urban planning. Having access to basic services like supermarkets, schools, medical centres or shops, in addition to access to social activities and to other people, such as family or friends, contributes to an individual's quality of life. Furthermore, accessibility is crucial for the economy. For example, people need access to jobs, as well as firms need access to employees, suppliers, and customers. Policies to improve accessibility also have influence on the environment and safety (Geurs et al., 2006; van Wee, 2016).

Despite the numerous papers published on accessibility in recent years (see Shi et al., 2020, for a review) we still poorly understand the (economic) value of accessibility levels, especially the added value of having multiple options to travel to (van Wee, 2016). It is plausible that, as more choice options are available, the additional benefit tend to decline, i.e. the added value of an additional unit is not constant, and is

subjected to the law of diminish returns (Maat et al., 2005). For example, the added value of having one supermarket within access compared to none is considerably high. Adding a second supermarket can still add value if it is cheaper, offers greater variety or it is closer. But the increase from 5 to 6 supermarkets placed at the vicinity would hardly add value (Metz, 2008). This paper is an exploratory study that aims to find out for which type of destinations it is (not) important for people to have multiple options available and why, to quantitatively assess the added value of having multiple options of the same destination available to travel to, and to explore factors that influence this added value. Finally, we aim to explicitly distinguish between uses, option users and non-users (see section 2). Such information is helpful to assess the pros and cons of policies that change accessibility levels, in this case policies for changes in the number of destinations within reach, for given destination types.

Section 2 describes the most relevant literature about the topic. Next, section 3 presents the study area, the Spanish city Villarrobledo, and the research context, followed by Section 4 explaining the methodology.

* Corresponding author.

E-mail addresses: j.a.annema@tudelft.nl (J.A. Annema), g.p.vanwee@tudelft.nl (B. van Wee).

¹ Current employer: Parcisa.

Sections 5 and 6 present the study design and results. Finally, in Section 7 and 8, we discuss the main findings and present the conclusions.

2. Literature overview

Following Geurs and Van Wee (2004:128) we define accessibility as *'the extent to which land-use and transport systems enable (groups of) individuals to reach activities or destinations by means of a (combination of) transport mode(s) at various times of the day (perspective of persons), and the extent to which land-use and transport systems enable companies, facilities and other activity places to receive people, goods and information at various times of the day (perspective of locations of activities)'*.

In line with this definition, four components of accessibility can be differentiated: land-use, transport, temporal and individual component (see Geurs and van Wee, 2004). The scope of this paper is related to the combination of the land-use and the transport component, specifically with the perception that citizens have about the number of destination options accessible, as well as their quality and spatial distribution.

Moving to the economic evaluation of transport-related projects, the concept of Total Economic Value (TEV) has been widely used. TEV can be understood as *'the sum of all relevant Willingness to Pay (WTP) values for any change in an individual's well-being due to a policy or project'* (Geurs et al., 2006:615). Several authors (e.g. Laird et al., 2009; Chang, 2010) identify three different relevant economic values: i) use values, which are derived from the direct consumption of a service or good, ii) option values, that are based on the future potential use of a service, and iii) non-use values, which are independent of any present or future usage but relate to the notion that people might value that other people can use a service or good. The specific aim of our research is to explore how much individuals are willing to pay for different variations in the number of options of the same destination available within their reach. Current literature supports the principle of diminishing marginal utility (Fig. 1). This principle states that individuals with an initially low number of destinations accessible will attach higher value to the addition of an extra destination than individuals with a higher number of destinations within reach (Martens, 2006).

Up to date, research about this topic has focused on the quantification of use, option and non-use values applied to the transport system (e. g. Geurs et al., 2006; Humphreys and Fowkes, 2006; Laird et al., 2009; Chang, 2010), and to the best of our knowledge only one scientific paper, Johnson et al. (2013) estimates use, option, and non-use values for different service levels of one public destination (Post Offices). To the best of our knowledge not any paper quantifies these combined values for other destination types.

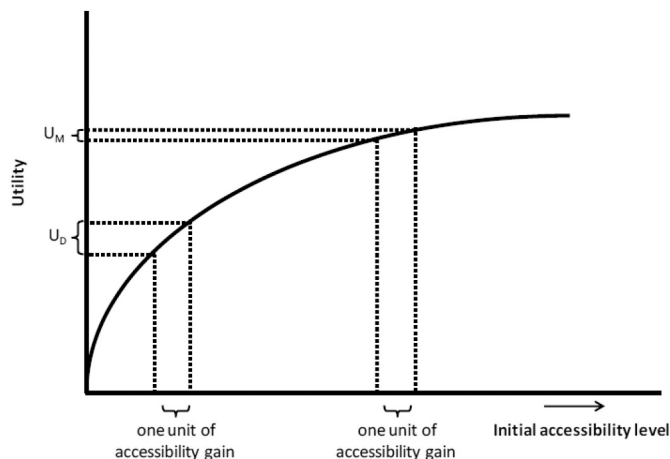


Fig. 1. Graphical representation of the law of diminishing returns of accessibility gains (Martens, 2006).

3. Study area

The population under study are the citizens of Villarrobledo, a Spanish city located in the autonomous community of Castilla-La Mancha (Fig. 2). The interest about improving accessibility in Spain has risen considerably in the last years. Proof of that is the publication of the Spanish Urban Agenda 2019, making use of a specific indicator that measures the percentage of the population within a certain distance from a selection of main basic services (food and dairy products, education centres, medical services, sport centres, etc.). The distances are service specific (Agenda Urbana Española, 2019). However, this measure does not consider people's preferences and needs, option values, or how much people value having multiple options within reach. It aims to ensure that people have access to basic services and destinations based on a distance criterion.

In 2019 Villarrobledo had 25,184 inhabitants (source: Instituto Nacional de Estadística – INE.) It is an important urban centre for the region, offering a rather complete variety of services from well-known supermarket chains to all kinds of medical services. Relative to other equally sized cities in the region it has a low population density of 29,36 inhabitants/km².

Using several public and other sources, for this study we selected a set of destinations (see Table 1), based on the eight basic services described in the indicator 2.1.2. of the Spanish Urban Agenda 2019. Some destinations were removed, and new ones were added based on two criteria: number of potential users and the frequency of service's use. We selected destinations that people regularly visit in their daily lives, mainly because of the importance of those destinations. In addition, the selection results in higher response rates and consequently more representative results.

Fig. 3 presents a map showing the location of each facility, providing information to identify areas with lower levels of accessibility to a specific type of destination, and the level of concentration (concentrated or dispersed) of destination types.

4. Methodology

4.1. Background

Measuring economically individual's preferences, option and non-use values is not a trivial task. In general, it is not possible to apply Revealed Preference (RP) methods to measure these values because they have no behavioural basis and they are not market goods (Chang et al., 2012; Bondemark and Johansson, 2017). Instead, Stated Preference (SP) approaches are generally taken. SP techniques are very flexible and, since they do not rely on existing markets and are based on hypothetical situations, they can be applied to almost all non-market goods or services, to both past and future changes, and can even capture all types of benefits, including non-use values (OECD, 2018).

Stated Preference techniques can be subdivided into two groups: Contingent Valuation Methods (CVM) and Choice Experiments (CE), also called choice based Conjoint Analysis. CVM directly ask the WTP when there is a hypothetical change in the quantity or quality of a non-market good or service. On the other hand, CE ask respondents to choose the most preferred alternative from a set of options with different attributes, and then, monetary values can be estimated indirectly if a price attributed is included (Geurs et al., 2006). Both approaches have several advantages and disadvantages. CVM can suffer from cognitive stress, starting-point bias or strategic bias. Moreover, they do not accurately measure the value of goods when they present a strong non-use component, when the respondent has little experience, or when the hypothetical context is unrealistic (Geurs et al., 2006; Chang et al., 2012). On the other hand, Chang (2010) stressed that CE would not be very useful when something in its entirety is investigated.

CVM are quite common methods, often used in environmental economics and in other areas, that many researchers have applied to obtain



Fig. 2. Villarrobledo's location in Spain.

Table 1

Destination types and number of facilities in 2020.

Destination	Facilities in 2020
Food stores	
Supermarkets	7
Butcheries	5
Fruit shops	2
Neighbourhood stores	8
Health	
Hospital	1
Health centres	2
Pharmacies	13
Education	
Kindergartens	7
Primary schools	7
Secondary schools	3
Libraries	2
Sports	
Public sport facilities	6
Gyms	5
Other services	
Hairdressers	20
Clothes shops	20

estimates about use, option and non-use values of non-market goods or services (e.g. [Humphreys and Fowkes, 2006](#); [Chang et al., 2012](#); [Johnson et al., 2013](#); [Chang et al., 2017](#)). Contingent Valuation Methods aim to estimate how much accepting or avoiding a hypothetical change is worth to individuals. Monetary values are based on the willingness-to-pay (WTP) or willingness-to-accept (WTA) ([OECD, 2018](#)). Due to its simplicity and the fact that we need to assess something in its entirety (i. e. a destination), we applied this stated preference method in this study.

4.2. A two-phase methodology

The methodology applied in this research can be divided in two phases. The first one is more explorative and qualitative, the second one is more quantitative, applying a specific CVM named 'payment cards' ([Johnston et al., 2017](#)). In both phases we made use of an online questionnaire.

The first explorative questionnaire was based on information about the study area. The aim of this questionnaire was to narrow the research to a few types of destination by knowing which ones are the most important for citizens for having multiple options within reach, and to understand the reasons why they may prefer to have more than one option of a particular destination. Moreover, this phase aimed to explore the main factors (travel time, price, variety, service quality, etc.) that influence the value perceived by individuals for each destination are also identified.

Based on this phase and the local context two final destinations, kindergartens and public medical centres, were chosen to be included in the phase 2. For these destinations we collected additional information in order to recreate the most realistic scenarios for the Contingent Valuation questionnaire. We not only estimated WPT values for having multiple options within reach, but we also explored whether these values vary for different sociodemographic groups. The appendix summarizes the second questionnaire. For the full questionnaires and more details of the study we refer to [Parra López \(2020\)](#). Both questionnaires were designed using the software *Qualtrics*, which was also used to analyse the results in addition to the statistical tool *Jasp*.

5. Phase 1: explorative study

5.1. Design

The questionnaire for the explorative phase had three parts. The first

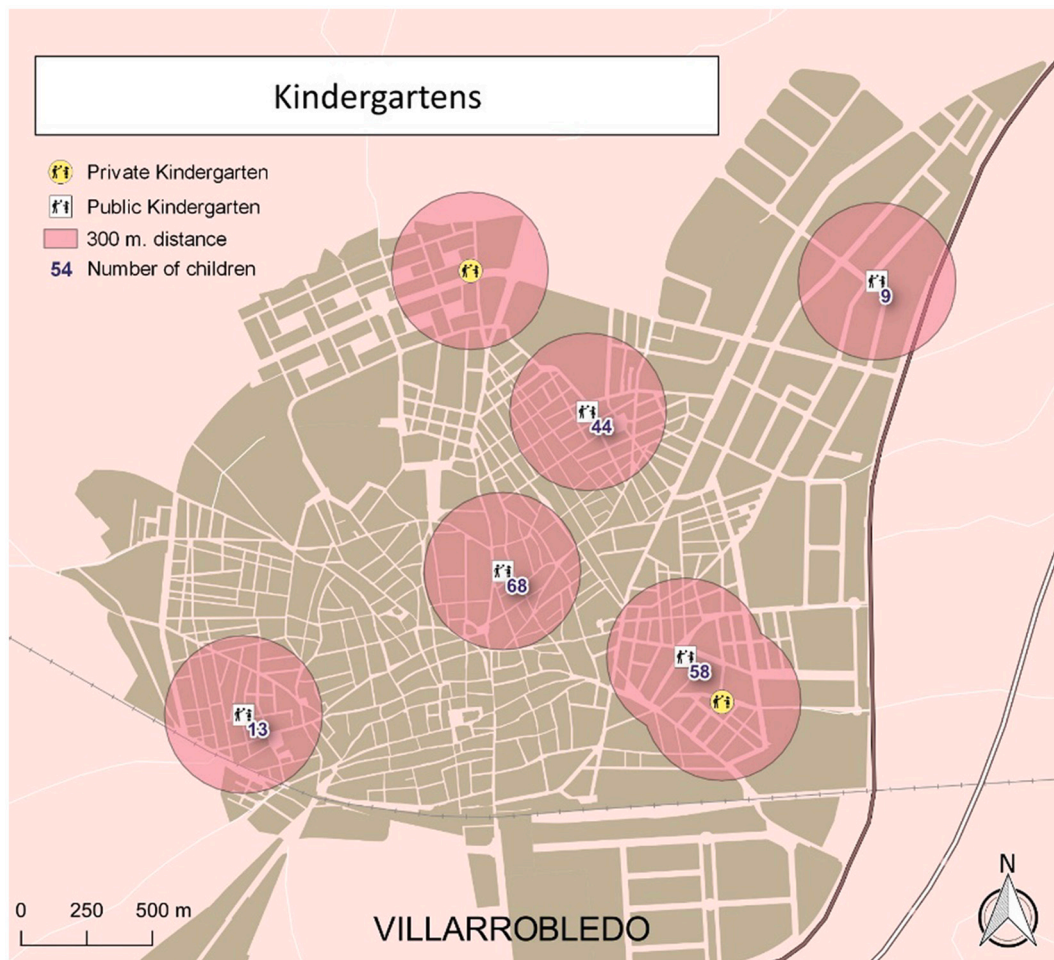


Fig. 3. Kindergartens' location in Villarrobledo.

part contained an introduction to the topic for the respondents and a general question about the importance they give to having multiple options for every facility category. The second part contained specific questions about each of the five destination types presented in Table 1. After some questions on behaviour, there was a question that aimed to know whether citizens perceive that the current number of destinations is adequate or whether more or less are needed. Moreover, the reasons why individuals might value having multiple options were asked, separating individual (own interest – consumer perspective) from collective (societal preferences – citizens perspective) reasons. Also, the most important factors for each destination type were asked. Finally, part three contained questions on socio-demographics. All the questions asked were closed-ended in order to make it easier for the respondent to answer. There was also an open-ended question at the end of each destination block in case the respondent wanted to give some additional information. The questionnaire was distributed by an anonymous link that was sent through different channels (e.g. Whatsapp contacts, LinkedIn posts and Facebook groups). A total of 154 people finished the survey with valid responses. For the following analysis, only completed and valid responses were used, except for the first general question which was answered by 206 people.

5.2. Results

Table 2 presents the importance of having multiple options for destination types within access. Almost 80% of the respondents considered that it was very important for them to have multiple options for medical centres. Educational centres, pharmacies and food stores were

Table 2
Importance of destination types (percentages).

Destination	Very Important	Important	Indifferent	Less Important	Nothing Important
Medical Centres	78	17	2	1	1
Educational Centres	62	29	4	1	3
Pharmacies	60	30	4	4	2
Food Stores	60	32	2	4	1
Libraries	33	41	14	6	5
Public Sport Facilities	22	53	12	5	8
Clothes Shops	12	42	26	9	11
Hairdressers	8	36	35	12	10
Gyms	7	40	32	9	12

the following options judged to be most important, with a very similar mean and distribution. This applies way less for all other destination types included in the questionnaire, the difference being statistically

Table 3
Differences between basic and secondary services, Mann-Whitney U test.

	W	p	Hodges-Lehmann estimate	Rank-Biserial correlation
Importance	379,477.000	< 0.001	1.000	0.548

significant (see Table 3). (Table 3). Therefore, it can be concluded that people appreciate having multiple options available of basic services more than secondary ones.

One argument that can explain the difference between both groups is the fact that people feel that they need more options of basic services to ensure the supply in any circumstance, while they can dispense with secondary services because they are not essential. This argument is supported by the reasons that people gave when asked about why they value having multiple options. For basic services, the motives that predominate are more related with option and non-use values. In this way, people value having alternative options of essential services to deal with uncertainty about the availability of supply (consumers perspective) and also to ensure that everyone has access to these services (citizens perspective). On the other hand, for secondary services, people appreciate having multiple options to be able to choose the one that best suits their personal preferences or tastes, and also, to have variety. Therefore, the reasons for secondary services are more related with use values and demand side uncertainty.

Regarding which factors are most appreciated for each destination, they also vary for each group. For all basic services, proximity is one of the three most valued factors, while it is one of the least important factors for the other services. Conversely, variety is more appreciated for secondary services than for essential ones. Finally, price is one of the most important attributes for all destinations, except from pharmacies.

Based on the results, as explained above two destinations were selected for phase 2: public medical centres and kindergartens. We first selected basic services only because people prefer to have more alternatives of basic services over more alternatives for non-essential ones. Secondly, public services are relatively comparable, more than several other destination types like for example supermarkets, increasing the suitability of a contingent valuation approach. Finally, an increase or decrease in the number of medical centres and kindergartens is realistic in the near future in this city, increasing the social relevance of understanding changes in the number of options available for people. In order to recreate realistically possible scenarios for phase 2 additional data about these two destinations, such as payment systems, evolution in time, number of users, etc., was gathered.

6. Phase 2: estimates of WTP

6.1. Design

The design of this questionnaire was based on the theoretical framework about Contingent Valuation Methods, in particular, payment cards (Johnston et al., 2017). The questionnaire was subdivided in three parts: i) behavioural and attitudinal questions, ii) scenarios for contingent valuations and related questions, iii) Sociodemographic questions. The first two parts apply to each destination type (medical centres and kindergartens), while the last one is unique.

6.1.1. Attitudinal and behavioural questions

The first part included the specific services related attitudinal and behavioural questions. These questions were useful to introduce the topic to the respondent and to identify the most important factors driving individual's attitudes towards both service destinations. These questions also aimed to classify respondents as users, option users and non-users, since the related questions varied for each group. Fig. 4 shows the set of questions asked to differentiate each user group for the kindergarten destination. In the case of medical centres, the frequency of service use in addition to private insurance holding were the criteria used to classify the respondents.

6.1.2. Contingent Valuation elicitation question

This second part represents the core of the survey, in which the contingent situation scenario was presented, and respondents were asked for their monetary valuations.

Before describing the hypothetical scenarios, a description of the current situation was provided. For both destinations, a map which showed the number and location of current facilities, both public and private, was presented. Moreover, information about the service opening hours and current capacity, as well as current monthly fees for kindergarten users was provided.

Based on the results of the first questionnaire and the contextual information gathered, different hypothetical scenarios were presented to the respondents. In the case of kindergartens, two scenarios were presented to the respondents. In one scenario the service had to be expanded because the demand for the service was supposed to increase, and in the second scenario the demand remained stable or decreased slightly and the supply of the service remains as the status quo. For the

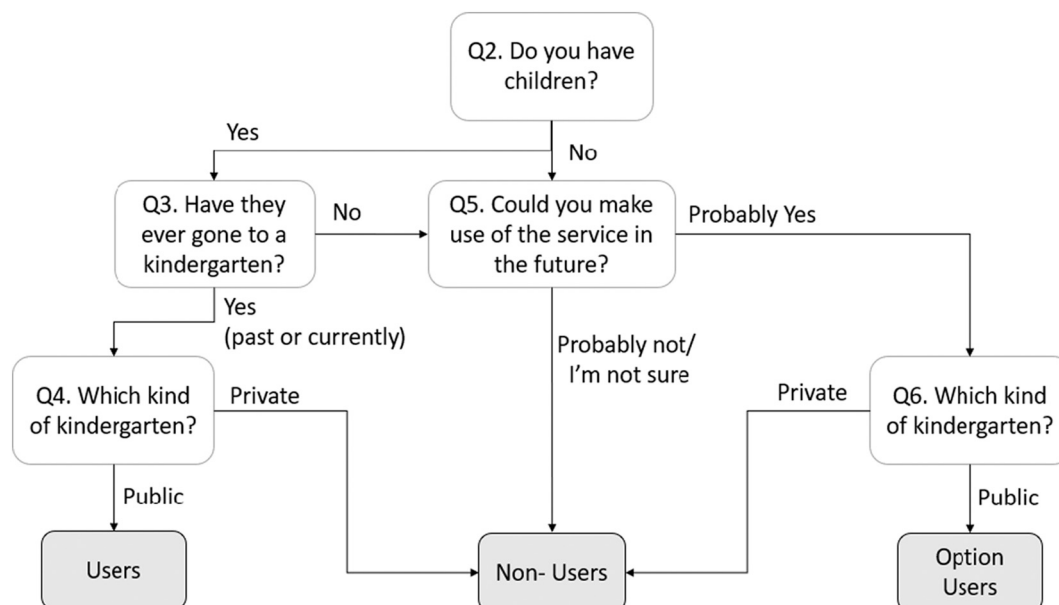


Fig. 4. User group classification for kindergartens.

first scenario, respondents could choose their preferred way to expand the service among a set of alternatives. For example, they could choose a new kindergarten to be built, or to extend the current opening hours of existing services, or to do nothing. On the other hand, in case of the medical centres, only the hypothetical situation in which the service had to be expanded was presented, as almost 60% of the respondents of the first questionnaire stated that there are not enough medical centres in the city and decreasing the number of options would mean the elimination of the service. For this service, two alternatives were presented: opening the current medical centre also during the afternoon or finishing the building of a second medical centre which construction was stopped in 2008 due to the financial crisis. After presenting the hypothetical scenarios, the related questions were asked. This elicitation questions can be asked in several ways, which are summarized by an example in the following table (See Table 4.).

In this case, payment cards were the contingent valuation method applied. Payment cards are more informative than bidding games since they reduce starting point bias and the number of outliers (OECD, 2018). On the other hand, they are cheaper to implement than single or bounded dichotomous choice methods as only mean or median values have to be calculated, avoiding complicated statistical calculus (Bate-man et al., 2002).

In this elicitation question, respondents were asked to indicate their (maximum) WTP from a list of values for each hypothetical scenario. The list of values was based on current and past fees of the services being evaluated. Moreover, in the case of kindergartens, the payment mechanism differed by user group. It is important to realize that kindergartens in this city are a semi-public service which is funded by monthly fees paid by users (regulated by the local government) and municipal taxes. Therefore, users and potential users were asked about monthly fees as they would be directly affected by any change in these surcharges. On the other hand, for non-users, the WPT was assessed via the willingness to pay annual taxes. In the case of medical centres, only tax based WTPs were asked for as taxes are the only way to collect funds for this service.

Respondents who were not willing to pay anything for the change proposed, were asked a follow-up question to understand their choice and to identify invalid or protest answers. It is very important to identify protest answers and treat them correctly to obtain unbiased results.

Table 4
Example of elicitation formats. Adapted from (OECD, 2018).

Elicitation format	Description
Open ended	What is the maximum amount that you would be prepared to pay every year, through a tax increase, to have an additional medical centre with the conditions I have just described?
Bidding game	Would you pay 5€ every year, through a tax increase, to have an additional medical centre with the conditions I have just described? If yes: keep increasing the bid until the respondent answers No. Then the maximum WTP is elicited If no: keep decreasing the bid until the respondent answers Yes. Then the maximum WTP is elicited
Payment card	Which of the amounts listed below best describes your maximum willingness-to-pay every year, through a tax increase, to have an additional medical centre with the conditions I have just described? List (0, 0.5€, 1€, 2€, ..., >20€)
Single-bounded dichotomous choice	Would you pay 5€ every year, through a tax increase, to have an additional medical centre with the conditions I have just described? (The amount is varied randomly across the sample)
Double-bounded dichotomous choice	Would you pay 5€ every year, through a tax increase (or surcharge), to have an additional medical centre with the conditions I have just described? (The amount is varied randomly across the sample) If yes: and would you pay 10€? If no: and would you pay 1€?

However, there is no consensus in the literature about the definition or classification of protesters, neither about how they should be treated in the analysis. Not all zero WTP values should be considered as protest answers as they may be true values, like when the respondent prefers the status quo to the situation proposed (Frey and Pirscher, 2019). Table 2, which is inspired by Chang et al. (2017), shows how respondents with a zero WTP were classified according to the reasons they selected from a list of pre-defined options, in the follow-up question. Moreover, an open option was given to the surveyed to state alternative reasons and we also included those reasons in Table 5. We included non-protest bids in the analyses, and excluded protest bids.

6.1.3. Sociodemographic questions

Finally, like in the first questionnaire, sociodemographic (including gender, age, occupation, annual income, or neighbourhood) questions were asked in order to assess the representativeness of the sample and to analyse how WTP vary according to respondents' demographic characteristics.

It is important to mention how WTP values are measured. We based our choices on OECD (2018). There is some controversy in the literature about whether mean or median WTP should be considered. In this case, median values are preferred over mean ones. This is because the distribution of WTP is skewed and only a small number of respondents are willing to pay very large values, whereas a large number of respondents have chosen very small (and even zero) values. In this situation, mean WTP is overestimated and median WTP is a better predictor of what the majority of people would actually be willing to pay.

6.2. Results

Unlike the first questionnaire, a deeper data pre-processing task had to be carried out before analysing the data gathered in this contingent valuation questionnaire. From the 254 questionnaires finished, some of them were discarded due to a high number of blank questions. Moreover, when the elicitation questions was left in blank, that questionnaire was also deleted. There were also some cases in which the questionnaire was invalid for the kindergarten part, but valid for the health centres' one. We partly included those questionnaires (for the valid parts only). Furthermore, students with no income have not been considered in the analysis. This because they do not currently pay any tax or fee asked in the questionnaire, which could have led to biased responses. After these data pre-processing steps, we obtained 197 useful questionnaires for the kindergarten services, and 203 for the primary health centres. Although the respondents were not an exact representation of the population, all important groups with respect to socio-demographic variables were included. Because of the explorative nature of this study representativeness is not a major issue. Tables 6 and 7 describe, respectively, the main features of the sample and the number of respondents in each user group based on the criteria described in the previous section.

In the case of kindergartens, more than half of the respondents are willing to pay 12€ per month additional to the current monthly costs for parents (median value) for expanding current services in the case

Table 5
Debriefing question. Adapted from Chang et al. (2017).

Non-protest bids
I cannot afford to pay more
It is not a priority service
I would not benefit from the change
I prefer private services
Protests bids
The service could be extended with current taxes and fees
Monthly fees should be increased instead of municipal taxes
Municipal taxes should be increased instead of monthly fees
Much money has already been spent on this service
The extra taxes would be used to other purpose
I do not have enough information to answer

Table 6
Sociodemographic characteristics of the sample.

	% of respondents
Age	
18–14	16
25–34	26
35–44	20
45–54	17
>55	21
Gender	
Male	30
Female	68
Other	2
Occupation	
Full time employee	47
Part time employee	14
Self-employed	12
Unemployed	10
Student	7
Retired	4
Other	6

Table 7
N° of respondents by user group and destination.

	Users	Option Users	Non-users
Kindergartens	72	53	72
Medical centres	63	75	65

demand increases (Scenario 1), and 8€ to remain the status quo in the hypothetical situation in which demand holds or decreases (Scenario 2). In other words, people are willing to pay more for expanding the service than for maintaining current facilities. Furthermore, not all the respondents are willing to pay the same amounts, resulting in statistically significant differences among respondents who are users, were users in the past, or will probably be users in the future, and those who have no children, prefer private kindergartens or simply do not make use of the service. Consequently, users and option users are willing to pay around 12€ in both scenarios, while non-users only 6€ and 2€ for the first (expanding the service) and second scenario (remaining status quo), respectively. This is quite reasonable as users and option users are directly affected by any change in the conditions of the service. However, for both scenarios, mean option users' values are higher than user values. One possible explanation could be that many of the respondents from the user group are past users who used the service years ago, so that they may perceive that the change would not benefit them now. Table 8 shows the central tendency values by user group for both scenarios. Missing values represent protest answers.

On the other hand, there is no statistically significant difference

Table 8
WTP central tendency values by user type for both kindergarten scenarios.

	Scenario 1: Expanding level of service			Scenario 2: Maintaining level of service		
	Option user	User	Non-user	Option user	User	Non-user
N° of responses						
Valid	39	59	41	41	52	36
Missing	14	13	31	14	20	36
WTP (€/month)						
Mean	13.95	11.86	6.37	11.81	10.77	4.67
Median	12	12	6	12	12	2
Std.	6.15	8.07	6.32	7.32	6.98	4.60
Deviation						
Minimum	0	0	0	0	0	0
Maximum	24	24	21	24	24	21

between users, option users and non-users in the case of medical centres, so the analysis have been made aggregating all the responses. The three groups present a median WTP value of 50€ per year for expanding current services. One possible explanation is that everyone is a potential user of this service, even if they do not currently use it. Therefore, option values would probably be high for option and non-users, being willing to pay the same amounts as regular users. Also, non-use values may play a key role since almost everyone stated in the first questionnaire that they want to ensure that everyone has access to this service. The difference in the values reported when considering the two possible alternatives to expand the service are not significant. Note that finishing the second medical centre (alternative 2) is more expensive than extending current schedule (alternative 1 - Table 9).

Moreover, no statistically significant relationship was found between demographic characteristics of the respondents and WTP values for both destinations. For all demographic variables, a Kruskal-Wallis statistical test was performed to test whether there was significant difference in WTP values for each sociodemographic group. For example, it is interesting to analyse whether older people have higher WTP values for expanding medical services, probably because they will make more use of them than a younger person. As Table 10 shows, this hypothesis does not hold, and the statistical test confirmed there was not such a difference for each different age group.

7. Conclusions

Main conclusions of this paper are first that the value of having multiple options available varies between types of destinations. For basic services this value is motivated by non-use and option values, for non-basic services use values dominate.

Secondly, in the case of kindergartens, more than half of the respondents are willing to pay 12€ per month additional to the current monthly costs for parents (median value) for expanding current services in the case demand increases, and 8€ to remain the status quo in the hypothetical situation in which demand holds or decreases. Users and option users have higher a WPT than non-users. For medical centres there is no statistically significant difference between users, option users and non-users, the median WTP value for all groups being 50€ per year for expanding current services. Both conclusions make clear that it is very relevant to distinguish between use, option and non-use values.

Thirdly, we did not find a statistically significant impact of demographic variables on WPT values. Fourth, sometimes, it is not only the number of options itself what people appreciate, but many other factors relevant for this appreciation should be considered, such as that citizens may prefer to improve current facilities rather than having new ones. Therefore, current capacity and characteristics of the destination being valued play a key role when people evaluate the overall supply of the service. In addition, the seemingly non-existence of loss aversion in case of kindergartens suggest that WTP values highly depend on which specific destination is being valued, and not on the overall amount of options available. And we expect that for non-public destinations, many

Table 9
WTP central tendency values by expansion alternative for health centres.

	Alternative 1: Extend current schedule	Alternative 2: Finish 2nd centre
N° of responses		
Valid	82	47
Missing	49	11
WTP (€/year)		
Mean	45.37	54.04
Median	50	50
Std.	41.43	43.47
Deviation		
Minimum	0	0
Maximum	180	180

Table 10
WTP values by age group for medical centres.

	Age groups				
	18–24	25–34	35–44	45–54	> 55
N° of respondents					
Valid	28	37	18	18	36
Missing	4	14	22	16	10
WTP (€/year)					
Mean	39.643	51.351	39.444	47.778	49.167
Median	20	50	20	50	50
Std. Deviation	25.889	44.482	43.45	51.854	44.873
Minimum	20	0	0	0	0
Maximum	120	180	180	180	180

other factors probably influence the appreciated value for each destination, since a greater variety is offered and people's preferences are very different. That is, the added value of an additional facility would highly be influenced by the specific characteristics of that facility, and of people.

To sum up, for the valuation of the number of options available and how they influence the total level of accessibility, the application of the law of diminishing returns seems to be limited, at least in some cases, and a more complex analyses should be made.

8. Discussion

As explained in section 1, most of accessibility indicators imply that having more options is better and increases the total level of accessibility, but the law of diminishing returns indicates that the added value of each additional destination is lower than the added value of the previous one. However, the results of this research suggest that this law does not always apply, if also the capacity of facilities and other characteristics are included. This section first presents some comments to the law of diminishing returns, followed by some practical recommendations. Finally, four possible avenues for future research are suggested.

8.1. Comments to the law of diminishing returns

We have shown that, for some destinations, user groups (users, option users, and non-users) have different WTP values. The difference implies that an additional destination option within reach would add considerably more value to users and option users than to non-users, even though their initial level of accessibility was the same. Every additional destination option does add value to all user groups, but not equally.

Another relevant finding is that sometimes not the number of facilities within reach matters for people, but the supply capacity of those facilities and their particular characteristics. Consequently, in some cases improving current facilities (for instance, extending the opening hours or current capacity) is preferred over having an additional option available.

Furthermore, WTP values for options to have kindergartens within reach at first face seem to contradict the concept of loss aversion, which theoretically implies that people have greater psychological attachment to things they currently possess, and thus, value losses higher than gains (Kahneman and Tversky, 1979; see a special issue of EJTIR on prospect theory and transport (Avineri and Chorus, 2010)). Furthermore, there could be some specific cases in which increasing the number of options available does not necessarily translates into higher levels of accessibility. For example, when the supply of public services highly exceeds the demand, public funds are wasted. Hence, increasing the number of public destinations can be perceived as an overall (accessibility and other aspects) utility decrease, not an increase. In this study case, two of all kindergartens in the study area had only 9 and 13 children and, in the case that the service level has to be reduced, it is very likely that one of these two, or even both, close. However, if one of the kindergartens

which had many children closes, WTP values to keep them open would have probably been higher. Thus, the added value of each option depends on the current situation and which specific destination individuals are valuing, and not only on the number of options itself. The seemingly absence of loss aversion could therefore be explained by the low decrease in losses if a small kindergarten would close, not necessarily real non-existence of loss aversion.

8.2. Recommendations

We realize this study only is a first, rather exploratory study. Therefore, results need to be considered with care before important decisions are made. Nevertheless, some indicative recommendations can be derived from our findings.

First, our results give a first indication of preferences of citizens for having multiple destinations available. Including these preferences may inform policy makers who need to decide on policies changing the supply of destinations. But we have to be careful. In theory this study provides monetary values (based on the WTP) for having multiple destinations available, and these values could be used in Cost-Benefit Analyses. But we recommend first doing more research in this area (see below) to allow for more robust valuations that consider more destination types in more spatial and societal contexts.

Moreover, policy makers should not forget substitution effects when deciding the price/fee for certain public services. For this particular case, kindergarten fees depend on the level of the family's income. If public kindergarten fees would increase, people with higher incomes would be paying similar fees than in case of private kindergartens, which offer higher quality services. Therefore, increasing fees for expanding a service could have a counterproductive effect, decreasing the potential demand due to substitution effects. On the other hand, when there is no difference in the valuation of two alternatives for the same service type, it is recommended to maintain the cheapest one. This does apply to our health centre case: expanding opening hours (alternative 1) of the current health centre is cheaper than finishing the unfinished second centre (alternative 2).

Moving to the private sector, this research can also provide useful information to current managers and future entrepreneurs offering activity options (shops, services, ...). The first questionnaire revealed the most relevant factors for the valuation of having multiple options within reach, for each destination type, and provides many suggestions for improvements (in the open-ended questions). It also evaluated the appreciation of individuals for the current level of services. Therefore, useful information is obtained to identify possible market opportunities or already saturated sectors.

8.3. Future research avenues

As explained above, this is only a first and a bit explorative study into the valuation of having multiple destination options within reach. A first interesting avenue for future research therefore would be to develop more sophisticated methods for the second part of the methodology, that is, the Stated Preference technique. Pilot questionnaires are recommended to explore the reasons behind protest answers. People might have valid reasons for protest answers, such as a lack of information or ideological reasons. Exploring motivations for protest answers therefore is recommended. Moreover, additional analysis could be performed, such as cluster analysis, in order to assess the heterogeneity of respondents.

A second direction for future research could be to perform studies on the value of having multiple destinations available in other contexts, such as rural areas as opposed to urban areas, and countries with other land use and/or transport systems, and at different spatial scales at which options are available (e.g. neighbourhood versus (inter)regional).

A third direction for future research is the inclusion of more destination types, such as non-essential services and non-public destinations.

Fourth, we recommend performing economic analysis, probably a

cost-benefit analysis, to evaluate the societal cost and benefits of such policy options. Such analysis could also provide information about the implications for the costs and revenues of local municipalities, including not only costs of more facilities, but also impacts on revenues from such facilities.

Fifth we recommend to explore in more detail how to include accessibility in the context of the value of having multiple destinations available, explicitly exploring the role of the transport system, the land use system, the temporal and the individual component, and their interactions.

A sixth option is to focus on how the information provided from the surveys could affect the choice for candidate policy options. Seventh, so far we position the value of having multiple destinations available in the context of valuations of people. We implicitly assume symmetry in preferences for losses and gains, but as explained in section 7.1 Prospect Theory makes explicit that people might value losses different from equally large gains. Eighth, we only study valuation of people in their role of consumers, but as citizens they may have other preferences (Mouter and Chorus, 2016) which could be studied. Seventh, having multiple

destinations available can also be studied from the perspective of fairness of transport systems and accessibility. Fairness is an upcoming theme in the academic literature (e.g. Martens, 2017). Finally, we were not able to study the impact of income on WPT values, due to the large number of respondents who did not want to answer the question on their income. In other countries people might have less problems with answering such questions, and then the impact of income on WPT could be assessed.

Author statement

I have no idea what I should state, but it seems I have to upload an author statement. So I do.

Maybe I should state there are no funders? This applies.

Acknowledgment

We thank two anonymous reviewers for their valuable comments on our draft paper.

Appendix A. Second questionnaire summary

Kindergartens

- Questions to classify respondents between users, option users, and non-users (Fig. 3)
- Description of the current situation in the city (number of services, location, schedule, fees, etc)
- Hypothetical Scenario 1 (demand increases):
 - o Choice of preferred method to expand the service
 - o Elicitation question: payment card question

Example for users and option users

Q14 How much would you be willing to increase the monthly fee for kindergarten services to be expanded?

- ☐ € 4
- ☐ € 8
- ☐ € 12
- ☐ € 16
- ☐ € 20
- ☐ > € 20 _____

Example for non-users

Q16 Which of the following amounts would you be willing to pay annually, by increasing municipal taxes, to expand kindergarten services?

- ☐ € 20
- ☐ € 50
- ☐ € 80
- ☐ € 120
- ☐ € 150
- ☐ > € 150

- o Follow up question to detect protest answers

- Hypothetical scenario 2 (demand decreases):
 - Elicitation question: payment card question
 - Follow up question to detect protest answers

Medical Centres

- Questions to classify respondents between users, option users, and non-users
- Description of the current situation in the city (number of services, location, schedule, past projects, ...)
- Hypothetical Scenario 1 (demand increases):
 - Choice of preferred method to expand the service
 - Elicitation question: payment card question
 - Follow up question to detect protest answers

Sociodemographic questions.

References

- Avineri, E., Chorus, C., 2010. Editorial: recent developments in prospect theory-based travel behaviour research. *EJTIR* 10 (4), 293–298.
- Bateman, I.J., Carson, R.T., Day, B., Hanemann, M., Hanley, N., Hett, T., Swanson, J., 2002. *Economic Valuation with Stated Preference Techniques: A Manual*. Edward Elgar Publishing Ltd, Cheltenham.
- Bondemark, A., Johansson, E., 2017. Accessibility and uncertainty: the option value of public transport. In: *International Conference Series on Competition and Ownership in Land Passenger Transport*.
- Chang, J.S., 2010. Estimation of option and non-use values for intercity passenger rail services. *J. Transp. Geogr.* 18 (2), 259–265.
- Chang, J.S., Cho, S.Y., Lee, B.S., Kim, Y., Yun, K.S., 2012. A dichotomous choice survey for quantifying option and non-use values of bus services in Korea. *Transportation* 39 (1), 33–54.
- Chang, J.S., Jung, D., Ross, C.L., Kim, J., 2017. Evaluating the nonuse values of expressways. *Transportmetrica A* 13 (5), 449–466.
- Frey, U.J., Pirscher, F., 2019. Distinguishing protest responses in contingent valuation: a conceptualization of motivations and attitudes behind them. *PLoS One* 14 (1).
- Geurs, K.T., van Wee, B., 2004. Accessibility evaluation of land-use and transport strategies: review and research directions. *J. Transp. Geogr.* 12 (2), 127–140.
- Geurs, K., Haaijer, R., van Wee, B., 2006. Option value of public transport: methodology for measurement and case study for regional rail links in the Netherlands. *Transp. Rev.* 26 (5), 613–643.
- Humphreys, M., Fowkes, A.S., 2006. The significance of indirect use and non-use values in transport appraisal. *Int. J. Transp. Econ.* 17–35.
- Johnson, D., Jackson, J., Nash, C., 2013. The wider value of rural rail provision. *Transp. Policy* 29, 126–135.
- Johnston, R., Boyle, K., Adamowicz, W., Bennett, J., Brouwer, R., Cameron, T.A., Vossler, C.A., 2017. Contemporary guidance for stated preference studies. *J. Assoc. Environ. Resour. Econ.* 4 (2), 319–405.
- Kahneman, D., Tversky, A., 1979. Prospect theory: an analysis of decision under risk. *Econometrica* 47 (2), 263–291.
- Laird, J., Geurs, K., Nash, C., 2009. Option and non-use values and rail project appraisal. *Transp. Policy* 16 (4), 173–182.
- Maat, K., van Wee, B., Stead, D., 2005. Land use and travel behaviour: expected effects from the perspective of utility theory and activity-based theories. *Environ. Plann. B* 32, 33–46.
- Martens, K., 2006. Basing transport planning on principles of social justice. *Berkeley Plann. J.* 19 (1).
- Martens, K., 2017. *Transport Justice: Designing Fair Transportation Systems*. Routledge, New York.
- Metz, D., 2008. The myth of travel time saving. *Transp. Rev.* 28 (3), 321–336.
- Mouter, N., Chorus, C., 2016. Value of time – a citizen perspective. *Transp. Res. A* 91, 317–329.
- OECD, 2018. *Contingent valuation method*. In: *OECD, Cost-Benefit Analysis and the Environment: Further Developments and Policy Use*. OECD Publishing, Paris.
- Parra López, M., 2020. *The Added Value of Having Multiple Options to Travel to: A Case Study in Spain*. MSc thesis. Delft University of Technology, Delft, the Netherlands. <https://repository.tudelft.nl/islandora/object/uuid:4ef1c5ba-f999-4575-a36e-84fbf90da571/datastream/OBJ/download>.
- Shi, Y., Blainey, S., Sun, C., Jing, P., 2020. A literature review on accessibility using bibliometric analysis techniques. *J. Transp. Geogr.* 87, 102810.
- van Wee, B., 2016. Accessible accessibility research challenges. *J. Transp. Geogr.* 51, 9–16.