Keywords: willingness to pay; demand responsive transport; rural areas transportation; logit model

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WILLINGNESS TO PAY FOR DEMAND RESPONSIVE TRANSPORT IN EAST SLOVAKIAN RURAL AREAS

Summary. The objective of this study was to investigate the feasibility of implementing a demand responsive transport system in the Košice and Prešov regions of East Slovakia. This was achieved through a willingness-to-pay survey conducted in six villages in the target regions. Two separate models were constructed based on the survey results to estimate the residents' willingness to pay for trips to the nearest major city or the regional capital. The study revealed that the average willingness to pay for trips to the nearest LAU 1 (NUTS 4) administrative center was €0.86 per kilometer, while for trips to NUTS 3 administrative centers, it was €0.38 per kilometer. These findings suggest that demand responsive transport may be more suitable for shorter local journeys than for longer journeys. The study also identified several variables that affect the willingness to pay, such as the frequency and quality of the existing bus transit system and the use of other modes of transport. Additionally, this study highlights the potential benefit of demand responsive transport for residents with mobility impairments or those who travel alone.

1. INTRODUCTION

Today's demographic, social, economic, and health risk factors, along with rapid technological advancements, are reshaping the definition of transport problems. Simultaneously, the development and integration of technology offer new solutions to these challenges. The "New Transport Planning Paradigms" [1] describes a shift in the transport planning and evaluation paradigm that aligns with these trends. The conventional transport planning approach focused on maximizing an individual's transport distance for a given amount of time and money. However, the new paradigm recognizes that mobility itself is not the end goal; rather, the primary objective is to make the necessary transport services and activities easily accessible to all.

This paper examines accessibility in rural areas, which can be defined as the ability of rural residents to access essential goods and services [2]. Improving accessibility in rural areas entails cost-effective measures to enhance access to goods and services that rural populations require for their social and economic development. By improving accessibility for rural populations, economic growth can be facilitated, social inclusion can be improved, and mobility can be enhanced.

The cost-effective improvement of accessibility in rural areas through traditional fixed transport systems is challenging in the current environment for several reasons. According to the Passenger Transport Strategy in Slovakia 2030, public transport is used for only 30% of all journeys, with lower levels of usage observed in rural regions. Moreover, compared to urban regions, public passenger

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transport has declined more rapidly in rural regions, where regular transport services to city centers throughout the day are unavailable [3]. The problem lies in the responsibility of self-governing regions, which are in charge of regular bus services in Slovakia. In rural areas of Slovakia, public passenger transport is primarily provided by a traditional fixed system (mostly by bus) with a predetermined timetable.

This paper aims to investigate the potential acceptance of a demand responsive transport (DRT) system among residents in selected rural areas in the Košice and Prešov regions. Using the contingent valuation method and willingness-to-pay (WTP) survey, we aimed to estimate the value that the DRT system could provide for these residents in comparison to the existing fixed transport system.

To achieve this goal, we conducted a survey in six villages with a total sample of 201 respondents. We developed two separate models to calculate the willingness to pay for a trip to the local administrative cities of Local Administrative Unit - LAU 1 level and Nomeclature des Unités territoriales statistiques - NUTS 3 levels).

This paper is organized as follows: Following the introduction, the second chapter presents a comprehensive literature review of the current state of knowledge regarding demand responsive transportation, encompassing its various types and methods employed for transport evaluation. The third chapter expounds on the methodology employed in the proposed WTP application in demand responsive transportation, including the area selection process and research procedures. The fourth chapter provides an in-depth analysis of the WTP model results, delineating the value that respondents were willing to pay for a demand responsive transportation service in their region. The fifth chapter offers a comparative discussion of the results with analogous studies, while the concluding section presents the primary findings, limitations, and potential applications of the results.

2. LITERATURE REVIEW

2.1. Demand responsive transport in rural areas

Accessibility in rural areas depends directly on the localization of residents' homes, the location of goods and services, and the transport system that links these two elements [2].

According to [4], many rural areas have limited access to public transport, which has a significant impact on residents with limited access to cars (children, older people, and people with disabilities). The use of new information and communication technologies and "smart" solutions can improve both the efficiency and quality of rural transport services [5, 6]. Demand-driven transport and flexible transport services are the most common approaches to addressing accessibility in rural areas [7]. Another study investigated the role of DRT among university students who are considered well-educated individuals who are more likely than others to adopt new technologies and approaches, even in transportation. Some studies have confirmed that this group of users prefers flexible on-demand services over traditional fixed route ones [8].

Several approaches are based on complementing or replacing a fixed transport system with defined transport routes and arrival and departure times by a flexible system based on the actual need to access goods or services. They are often used for specific groups of the population (e.g., those visiting hospitals or traveling to an airport or shopping mall) [9]. The advantage of these systems is that they increase the benefits to the population, as transport is available when they need it and is often "door to door" [4].

There are several types of DRT systems. Based on the literature review, we tried to group the existing DRT systems according to the degree of flexibility. The degree of flexibility's influence on one side is the comfort for travelers (degree of accessibility) and on the other side is the level of cost for operators (cost efficiency). We distinguish two basic types of DRT systems based on the degree of flexibility: full flexibility (door-to-door systems) and semi-flexibility (stops and points of interest)

Full flexibility systems are described in the literature [4, 10–13] as demand-oriented transport, all the parts of which are fully flexible. The system is based on door-to-door services provided for travelers. Travelers can choose the time as well as the departure and arrival points. Systems that do not allow ridesharing (collecting passengers) are very close to conventional taxi services. This type of service is suitable for disadvantaged travelers (older people or travelers with different kinds of disabilities) and increases their accessibility. However, this is also the most complex system for implementation, and it has the highest expected operational costs.

Semi-flexibility systems

These systems offer travelers flexibility only in several steps of the journey. Based on the literature review [4, 10–12, 14], limited flexibility mainly concerns the route of the journey and the stops along it. The most common variations of these systems are multiple predetermined stops (bus stops or points of interest) along the route without the possibility of deviating from the route; predetermined vehicle stops with possible deviations from the route depending on the current demand; and cases in which only the starting point and the final destination are determined, with flexible intermediate stops and only one stop (start or destination) determined by several flexible stops. Naturally, these variations have different impacts on the level of accessibility and the operational costs of operators.

In our research, we have chosen to test the first type of DRT system, which is full flexibility. The main reason for selecting this type was to provide the respondents of our pilot research with a clear and easy-to-understand scenario.

2.2. Willingness to pay in demand responsive transport

In the beginning, contingent valuation was massively used by environmental economists when valuing changes in the environment. In the 1990s, this method began to also be used in the evaluation of cultural projects. Gradually, contingent valuation methods began to be used in several areas, including transport.

Contingent valuation methods, particularly WTP, are usually used for the estimation of passengers' perceived value of different aspects of the transport. The most common approach in the literature is to use WTP for the estimation of savings in passengers' travel times (value of time) [15, 16]. Several studies have also focused on the estimation of the value of passengers to improve different quality aspects of provided transport services [17–19].

The purpose of our study is to analyze the possibility of introducing a new DRT service in rural areas of the Košice region instead of or to complement existing fixed bus transport lines. Our approach is to verify whether passengers would be willing to pay more (compared to the current fixed bus transport system without a suitable timetable) for a DRT service that will provide them with higher availability. A very similar approach was introduced in [20], in which the authors tried to estimate the appropriate DRT fare for bus users upon the introduction of a new system. The research was focused on the Oesan-myeon region in South Korea, and the WTP methodology was used for the estimation of the extra fare that passengers would be willing to pay compared to the existing fixed bus transport fare. Based on the results of the study, the values of DRT were 38.85%, 31.03%, and 30.12% higher in terms of overall assessment, usability, and convenience, respectively.

3. METHODOLOGY

The proposed research was carried out by dividing the methodology into several main steps, which are illustrated in the flowchart in Fig. 1.

3.1. East Slovakia region: Research area definition

The region of East Slovakia is classified as a Nomenclature of Territorial Units for Statistics (NUTS) level 2 region located on the Schengen border of the European Union. [21]. It borders Poland to the north, Hungary to the south, and Ukraine to the east. It is one of the most remote regions in the EU.

Suburban public transportation in this region is organized by two separate public administrations: the Košice self-governing region and the Prešov self-governing region (at the NUTS 3 level).

The Košice region, with an area of 6,754.3 km^2, is located in the southeast of the Slovak Republic and occupies 13.8% of its territory. It is the fourth largest region in Slovakia by area. It borders the Hungarian Republic to the south and Ukraine to the east. At the end of 2020, a total of 802,092 inhabitants lived in the Košice Region. With a share of 14.7% of the Slovak population, the Košice region was the second largest in Slovakia. More than 44% of the population in the region lives in rural areas. The Prešov region, with an area of 8,975.2 km^2, is located in the northeastern part of Slovakia and is the largest region in the country, covering 18.4% of its territory. It shares a border with Poland to the north, Ukraine to the east, and the Košice region to the south. The Prešov region had a population of 670,656 at the end of 2020, which represents 12.3% of the total population of Slovakia. More than 60% of the population in the region lives in rural areas.

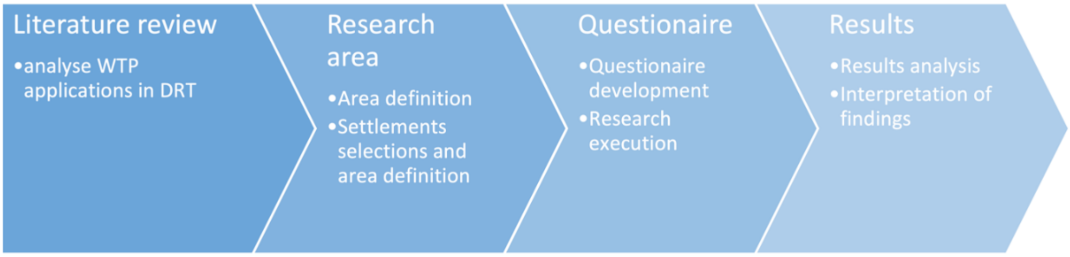

Fig. 1. Flowchart of the methodology steps taken during the research. (Source: the author's contribution)

There are several challenges faced by self-governing regions in Slovakia in providing cost-effective and sustainable public transport, especially in rural areas. In this paper, the focus is on East Slovakia, which includes the NUTS 3 regions of Košice and Prešov. Based on the analysis of annual reports provided by these regions, it is evident that the cost-effectiveness of public transport is decreasing. From 2009 to 2019, the expenditures of all public transport operators in the Košice region increased by 32%, while the mileage remained nearly consistent. However, the number of passengers decreased significantly from 27.8 million in 2009 to 20.5 million in 2019. In 2020, due to the COVID-19 pandemic, the number of passengers decreased even further to 12.9 million, representing a 37% decrease compared to 2019. Despite this significant decrease in passengers, the cost of all operators decreased by only 6% compared to 2019. Similarly, in the Prešov region, the expenditures of all public transport operators increased by 15% over the same period, while the mileage remained nearly constant. However, the number of passengers decreased from 33.4 million in 2009 to 21.3 million in 2019. In 2020, due to the COVID-19 pandemic, the number of passengers further decreased to 13.7 million, representing a 36% decrease compared to 2019. Despite the significant decrease in passengers, the cost of all operators only decreased by 3%.

To keep travel fares affordable for all social groups in the region, self-governing regions provide subsidies from their budget to selected private transport operators, thus keeping public transport as accessible as possible to all people living in the region. These subsidies are intended to cover all operating costs above the revenue collected and the operator's reasonable profit. However, the situation in this area is not good. While the total costs of all operators increased by 32% in the Košice region and 15% in the Prešov region over a period of 10 years, the subsidies from the public budget increased by 102% (Košice region) and 63% (Prešov region) for the same period. This situation could be justified by an increase in the quality of provided public transport services, but the mileage covered by all operators stayed consistent, and the number of passengers decreased by 26% (Košice region) and 36% (Prešov region). Based on this development, the cost-effectiveness of public subsidies dropped dramatically. The subsidies per km mileage increased in the Košice region from €0.41 in 2009 to €0.83 in 2019 (102%) and in the Prešov region from €0.49 in 2009 to €0.82 in 2019 (63%). The subsidies per passenger in the Košice region increased from €0.39 in 2009 to €1.086 in 2019 (178%) and in the Prešov region from €0.49 in 2009 to €1.090 in 2019 (156%).

There are several reasons for this development. Based on our knowledge of the situation, one of the reasons is the inappropriate frequency of bus arrivals and departures, especially in remote rural villages of the region. According to the current timetable, in some municipalities, bus transport is provided only twice a day (in the morning and evening). This, of course, reduces accessibility for residents who use personal transport (cars). This highlights the possibility of implementing demand responsive transport (DRT) projects as a substitute for or supplement to the traditional fixed transport system.

3.2. Settlements and households selection

For the purpose of the study, six villages were selected, with varying size and location characteristics, to potentially identify villages suitable for further, more detailed, study. Iliašovce, Slatvina, and Spišské Vlachy were selected from the Košice region, and Roškovce, Hrabovčík, and Komárov were selected from the Prešov region. The following figure illustrates the analyzed area and the villages included in the study. The villages are represented as blue dots, while the red lines represent the network of fixed-route bus transportation lines operating through the villages, with their stops represented as grey dots. It is important to note that only one stop within each settlement has been considered for the chart.

Fig. 2. Map of the analyzed area, selected villages (blue dots), and all fixed route bus lines passing the analyzed villages (red lines) and their stops (gray dots). (Source: the author's contribution)

One of the main criteria for village selection was the accessibility of the village via public transport and location within the road network of the region.

Spišské Vlachy represents a village located on the main routes between major towns, which also allows for very good accessibility via public transport with frequent arrivals and departures of buses.

Iliašovce, Hrabovčík, Komárov, and Slatvina represent villages that lay outside the main routes between major cities but still pass through and lie along routes connecting other villages in the area, allowing for good coverage by public transport. Roškovce represents an isolated dead-end village, with no routes passing through to other villages and providing minimal public transport coverage.

Information about the number of respondents for each village, the population and distance from major cities in the region (represented by the distance from local administrations on the NUTS 3 and LAU 1 levels), as well as the proportion of respondents with a positive answer to the first question, are presented in Table 1.

The selection of households was based on randomized sampling, wherever feasible. In smaller settlements, the primary thoroughfare was selected, and every alternate household was included in the study. The collected sample is representative of all valid responses collected in the villages. The sample was limited by the number of households and the return rate of questionnaires. The interviewers were recruited from the student bodies of local universities and were trained to comprehend the research objectives. Preference was given to students possessing domain knowledge.

3.3. Questionnaire development

As previously stated, the willingness to pay methodology was used to assess the feasibility of demand responsive transport. A questionnaire was constructed for this purpose.

Table 1

Villages selected for the study

	Iliašovce	Slatvina	Spišské Vlachy	Roškovce	Hrabovčík	Komárov
Respondents	36	37	27	30	35	36
Distance to LAU 1 administration in km	10	42	22	10	6	8
Distance to NUTS 3 administration in km	93	61	86	84	54	50
Population	1 023	309	3 362	137	328	453
% of respondents willing to pay	44	41	52	80	82	83

(Source: the author's contribution)

The questionnaire started by introducing the following willingness to pay scenario:

"Imagine that bus transport in the form in which you know it would be canceled in your village and would be replaced by individual transport. This transport would have the character of a taxi service or of a shared taxi service that would take you from your place of residence to the destination of your trip and back (round trip) at the time of your choice. Your municipality would reimburse you for part of these costs equal to the current price of the ticket, but you would have to pay extra directly to the driver of the vehicle for this service every time you travel".

A standard series of questions followed, starting with the direct question of whether the respondent would be willing to pay for this new service. In the further analysis, only respondents who provided a positive answer to this question were considered, as respondents with a negative answer would create a bias when calculating the willingness to pay based on the following two questions.

If the respondents provided a positive answer to the first question, they were then asked two similar questions of the following form: "Would you be willing to pay (x) EUR for a return trip to (local administration city)?" The first question contained the local LAU 1 (local administrative units) administrative city, and the second one contained the local NUTS 3 administration city. The sum the respondents proposed was randomly generated from a uniform probability distribution from the range between 0 and 1 EUR per kilometer (respondents were asked about the resulting sum directly for simplicity). The upper bound of this range was selected based on the subsidies discussed previously.

These questions were then followed by a series of questions concerning the quality assessment and utilization of public transport, as well as a set of socio-demographic questions. Questions concerning the potentially reduced ability of the respondent to travel alone (due to age or health concerns), frequency of travel, and utilization of different modes of transport were also included. In total, questions covered the following topics (with possible answer options where applicable):

- Does any family member utilize local public bus transport?
- How many times per week does your household utilize local public bus transport?
- How do you perceive the quality of the local public bus transport?
- What do you perceive to be the main problems?
  - Need to use transfers to get to my final destination
  - Length of travel
  - Ticket price
  - Unsatisfactory arrival times of buses
  - Bus stop is too far from my house
  - Bus stop is too far from my destination

- Gender
- Age
- Economic activity
  - Employed
  - Employed – working in shifts
  - Entrepreneur
  - Student
  - Retired
  - Unemployed
  - Disabled
  - Other
- Family status
  - Single
  - Married
  - Divorced
  - Widow/widower
- Highest education attained
- Income
- Disability status
  - Without restriction to movement
  - Slight restrictions to movement
  - Impaired movement
- Ability to travel on your own
- Ownership of a driving license
- Ownership of a bus pass
- Utilization of various forms of transport
  - Bicycle
  - Motorbike
  - Car
  - Bus
  - Train
- Number of trips undertaken per week outside of your village

Questions were formulated as either single answers, numerical answers, or answers provided on a 7-point Likert scale answer to avoid ambiguity.

The questionnaires were distributed physically to households in the given villages, along with instructions on how to fill them out, and were collected after one week, giving the respondents enough time to fill them out. This format, while not optimal, was selected due to the lockdown restrictions in effect at the time of the research. The research was publicly endorsed by the mayors of each village to improve reliability.

4. DATA ANALYSIS

Based on the questionnaire, two logit models were constructed, one concerning the LAU 1 local administration center and one for the UTS 3 local administration center, with the probability of accepting the corresponding proposed sums serving as the dependent variables in each model. The resultant models are presented in Tables 2 and 3, respectively. Both models included many expected results, such as the proposed amount the respondent was asked to pay having a negative impact on willingness to accept the payment and the positive impact of the respondents' utilization of bus transport on willingness to accept the payment. Of interest is the variable by which respondents expressed their ability to travel alone; respondents who need someone to accompany them presented a lower probability of accepting the proposed amount. This would indicate that demand responsive transport would not be able to alleviate this need but would represent an additional cost due to the need to pay extra for the accompanying person as well, representing a potential problem, as these people could be one of the main target groups for this form of transport. Finally, both models contained the variable representing whether the length of travel is perceived as a problem of the current bus transport system by the respondents, and a negative impact was found on the probability of accepting the proposed amount. One possible explanation could be that these respondents travel longer distances than others on average, which would mean higher additional costs for the demand responsive transport system, as its cost is calculated per km of travel. This could indicate that demand responsive transport could be more suitable (or more accepted) as a replacement for short local journeys.

Table 2

Logit model for LAU 1 center (NUTS 4 equivalent)

	Estimate	Std. Error	z value	Pr(>|z|)
Intercept	6.76	2.81	3.078	0.002083 **
Proposed amount	-5.2014	1.56	-3.984	6.77e-05 ***
Iliasovce	-3.7339	1.0910	-3.423	0.000620 ***
Slatvina	-6.4511	1.86	-4.516	6.31e-06 ***
Spisske_Vlachy	-3.7611	1.1164	-3.369	0.000755 ***
Roskovce	-3.4392	1.0270	-3.349	0.000812 ***
Bus utilization	2.04	0.8550	2.574	0.010060 *
Perceived quality of busses	-0.5488	0.2164	-2.536	0.011208 *
Problem - length of travel	-1.6833	0.7498	-2.245	0.024761 *
Ability to travel on your own	-2.4943	1.1280	-2.211	0.027024 *
Travel by car	2.23	0.6454	3.567	0.000361 ***

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The LAU 1 model also contained the perceived quality of the existing bus transit system as a statistically significant variable, with respondents who perceive the existing service to be of higher quality being less likely to pay for a substitute. Also, respondents who utilize their own cars were more likely to accept the proposed amounts, meaning the demand responsive transport could also act as a substitute for personal transport for short distances.

The NUTS 3 model was more complex, containing a few additional explanatory variables. The first one concerned the frequency of utilization of the current bus system by the respondents, which seems to have a negative impact on the probability of accepting the proposed amount. This can be attributed to the fact that a more frequent utilization of the transit system would mean higher cumulative costs for the proposed demand responsive transport for these respondents. Respondents who expressed having to transfer during their journey, the distance to their local bus stop, and the current price of bus tickets had a higher probability of accepting the proposed amount, as expected. Respondents who see the current arrival and departure times and the distance to the destination of their journey from the bus stop as problems presented a lower probability of accepting the proposed amount, which is counterintuitive. Either the question was ambiguous to the respondents, or this matter requires further research. The disability status of the respondents was also a statistically significant variable, as respondents with impaired movement had a higher probability of accepting the proposed amount. The last set of variables captured the frequency and types of transport utilized by the respondents; respondents who own a bus pass, frequently travel by bike or bus, or make many individual trips per week presented a higher probability of accepting the proposed amount. The main goal of these models was to calculate the theoretical distribution function of the respondents' willingness to pay. This was done separately using the LAU 1 model and NUTS 3 model, as presented in Figs. 3 and 4, respectively.

The cumulative distribution functions were used to calculate the median and mean willingness to pay for the study sample as a whole, as well as for each individual village (using the corresponding model from the whole sample but sample data for the village only). The results are presented in Table 4. Note that the values were calculated after excluding respondents who, in the first question, answered that they would not be willing to pay for the demand responsive transport at all, irrespective of the proposed amount. The main result is that, in all cases, the willingness to pay calculated for the LAU 1 model was higher than for the NUTS 3 model. This corresponds with previous results suggesting that demand responsive transport is more suitable for shorter local journeys. Secondly, for the LAU 1 model, the willingness to pay approached the current subsidy per km of travel, whereas for the NUTS 3 model, it was nearly half of the current subsidy.

These results, when combined with data concerning the number of passengers per destination (which can be obtained from bus utilization and occupancy data) and the cost per km of the applicable demand responsive transport solutions, can be used to identify locations suitable for the implementation of demand responsive transport. This, however, is beyond the scope of this study.

Table 3

Logit model for NUTS 3 center

	Estimate	Std. Error	z value	Pr(>|z|)
Intercept	2.39	4.0639	0.599	0.549239
Proposed amount	-18.2933	4.43	-3.800	0.000145 ***
Iliasovce	-5.4777	1.74	-2.933	0.003354 **
Slatvina	-8.1897	3.1646	-2.588	0.009656 **
Spisske.Vlachy	-5.5858	2.1746	-2.569	0.010210 *
Roskovce	-5.2191	1.60	-2.922	0.003476 **
Bus utilization	6.0608	3.0822	1.966	0.049249 *
Bus utilization frequency	-2.1515	0.6850	-3.141	0.001685 **
Problem - transfer	4.01	1.79	2.773	0.005558 **
Problem - length of travel	-4.2875	1.49	-2.722	0.006481 **
Problem - ticket price	2.91	1.33	2.037	0.041670 *
Problem - arrival/departure times	-3.6046	1.1807	-3.053	0.002266 **
Problem - distance to bus stop	3.74	1.61	2.077	0.037843 *
Problem - distance to destination	-2.9373	1.11	-2.127	0.033440 *
Disability status	4.0348	1.26	2.836	0.004566 **
Ability to travel on your own	-6.8481	2.24	-2.704	0.006846 **
Ownership of a bus pass	3.43	1.27	1.924	0.054329 .
Travel by bicycle	1.51	0.8672	2.197	0.028034 *
Travel by bus	1.86	0.9272	1.972	0.048596 *
Number of trips per week	0.7522	0.2944	2.555	0.010625 *

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1. (Source: the author’s contribution)

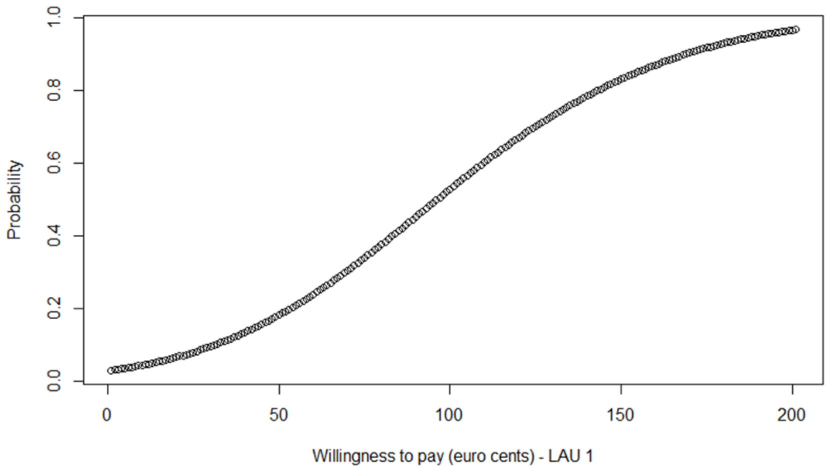

Fig. 3. Cumulative distribution function of willingness to pay for the LAU 1 model. (Source: the author's contribution)

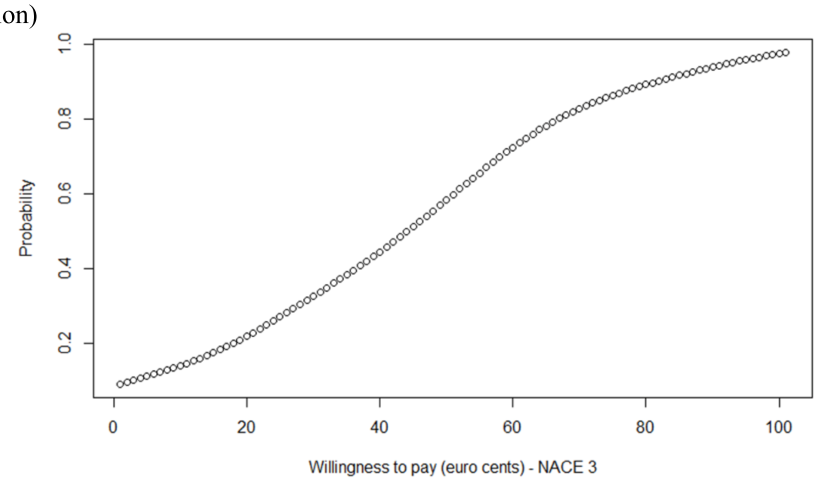

Fig. 4. Cumulative distribution function of willingness to pay for the NACE 3 model. (Source: the author's contribution)

Table 4

Median and mean willingness to pay in euro cents

	median LUA1	mean LAU1	median NUTS3	mean NUTS3
Total	97.00000	85.86458	45.00000	37.92596
Iliašovce	78.00000	60.05985	22.00000	25.19588
Slatvina	58.00000	53.17181	14.00000	15.07105
Spišské Vlachy	66.00000	54.30499	30.00000	26.06234
Roškovce	79.00000	64.71485	39.00000	32.72166
Hrabovčík	129.00000	115.21098	57.00000	52.30663
Komárov	128.00000	119.25288	58.00000	51.94129

(Source: the author's contribution)

5. DISCUSSION

The research results indicate that the application of a DRT system in the proposed areas is valid. Most recent studies support the idea that DRT is preferred over fixed-route transport and is especially applicable in scenarios with disadvantaged travellers [22]. In this research, this could not be absolutely proven, as the respondents with disabilities usually have seen benefits from DRT only in the longer distances of the second model. Moreover, in cases in which the traveler needs an accompanying person, the probability of using a DRT decreases, probably due to the perceived additional costs for the accompanying person.

The sum of willingness to pay identified by the research is considerably higher than identified by [20]. This can be the result of the nature of the research, as the cost per 1 km was determined as the WTP value as in [23].

In this research, the length of the trip had a negative effect on the probability of the payment, which is opposite to a common finding reported, for example, in [5]. The walking times represented as the first-leg and last-leg distances in this research were significant only in the second model with routes to the main administration center. Despite the significant positive effect of walking time as defined in [24], in this case, only the first leg had a positive effect on willingness to pay.

According to the results, the DRT could be seen as a substitute for private car owners in terms of short-distance transportation, which is in line with the assumptions presented in previous research [8, 25], according to which young, well-educated, and affluent individuals tend to swap their personal vehicles for DRT service.

6. CONCLUSIONS

This study analyzed the willingness to pay for a demand responsive transport alternative to the current bus transport system in East Slovakia. The study utilized a questionnaire to examine the factors affecting respondents' willingness to pay, and six villages with varying characteristics were included in the analysis. The study presented respondents with a hypothetical scenario in which the current bus transport system would be replaced by a flexible transport system, incurring an extra cost.

Two separate logit models were constructed to calculate the willingness to pay for both scenarios, with the results showing that the demand responsive transport system could be more suitable for shorter local journeys.

One of the most interesting findings was that respondents who need to be accompanied while traveling due to their high age or health problems (which is one of the main target groups with high potential benefits) presented a lower willingness to pay, indicating that the demand responsive transport service may not solve this problem and may require these individuals to pay for multiple people per journey. However, for the NUTS 3 model, respondents with impaired mobility due to disability presented a higher willingness to pay. Other factors affecting willingness to pay included the level and frequency of utilization of the current transit system and its perceived problems.

The present research has limitations in terms of its sample localization, which purposely focused on sparsely populated settlements with a higher share of elderly inhabitants. Additionally, the selection of settlements could be influenced by the unavailability of other public transportation means.

The resulting willingness to pay, in combination with data on subsidies for the current transit system and the costs of potential flexible alternatives, could be used to identify locations where demand responsive transport could be socially or economically viable.

Acknowledgment

This research was carried out within the project VEGA grant number 1/0455/20 and APVV project APVV-19-0263.

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Received 29.01.2022; accepted in revised form 02.06.2023