Innovative solutions for sustainable mobility in areas of weak demand. Some factors influencing the implementation of the DRT system in Enna (Italy)

Cite as: AIP Conference Proceedings **2343**, 090005 (2021); https://doi.org/10.1063/5.0047765
Published Online: 30 March 2021

Tiziana Campisi, Antonino Canale, Dario Ticali, and Giovanni Tesoriere

Innovative Solutions for Sustainable Mobility in Areas of Weak Demand. Some Factors Influencing the Implementation of the DRT System in Enna (Italy)

Tiziana Campisi[a],Antonino Canale, Dario Ticali and Giovanni Tesoriere

University of Enna "Kore" - Faculty of Engineering and Architecture – Cittadella Universitaria 94100 Enna (EN) – ITALY

[a)] Corresponding author: tiziana.campisi@unikore.it

Abstract. The growing need to move for different reasons, pushes the average user to compare and select modes of transport that meet both economic requirements and the possibility of connection to the areas to be reached. Mobility has suffered a major setback due to the COVID-19 and in particular the local public transport has experienced severe discomfort caused by the need to maintain social distancing. In areas with low demand for transport, where often the local transport services do not connect to peripheral areas, it is considered appropriate to evaluate the possibility of implementing forms of transport on demand and in particular the DRT (Demand Responsive Transport). The present work shows a statistical analysis related to a small urban center of Sicily, characterized by weak transport demand, comparing the results obtained by the dissemination of a survey to two groups of the population, inhabitants and commuters. It was possible to understand a hypothetical propensity to DRT and which parameters influence these choices the most. The results lay the basis for future research and help the local administration to revise the urban traffic plan.

Keywords: sustainable city development, DRT, weak demand, statistical analysis

INTRODUCTION

Mobility in Italy and in the European context is strongly influenced by the demand for transport (motivation of travel, type of user, selected means of transport) and supply (infrastructure and services). In the last few years technology has helped the improvement of infrastructures both in the planning phase with the selection of the best infrastructure through the comparison of scenarios through the micro-simulation of traffic and the evaluation of surrogate dark parameters, through the adoption of I BIM models [1,2,3] during the design phase and through the use of ITS tools for real time monitoring [4,5,6]. The development of a preparatory SWOT analysis[7] and the spread of participatory planning for transport choices, are a useful tool to make Administrations and citizens cooperate through a bottom up approach [8]. This approach allows a 360 view of the criticality of infrastructures and services and therefore the analysis of this can improve the strategic choices. In urban areas the most widespread transport services are often local public transport services and, looking at Italian cities, many of them have not yet developed other forms of services due to infrastructural or demand problems (cities often depopulated or with a low percentage of socio-cultural attractions). In addition, the supply of Local Public Transport (LPT) lines in many southern Italian cities has not been optimised with respect to demand, a factor that determined a large margin of economic inefficiency and an average daily use of only one paying passenger on some lines. Observing data on Italian mobility over the years, there has been a strong increase in private car travel, with a consequent increase in vehicular traffic and health costs linked to accidents, worsening air quality, and an increase in the number of non-autonomous users when travelling in the city. The study of different traffic scenarios and the balance between transport supply and demand can be assessed at different scales in a preventive manner by simulating traffic [9,10,11] and estimating the level of service [12,13] and safety surrogate parameters [14,15].

International Conference of Computational Methods in Sciences and Engineering ICCMSE 2020
AIP Conf. Proc. 2343, 090005-1–090005-10; https://doi.org/10.1063/5.0047765
Published by AIP Publishing. 978-0-7354-4088-3/$30.00

Therefore, in order to favour a greater use of public transport, trying to contain spending, a service has been thought of that aimed, at least as far as the so-called soft hours are concerned, i.e. those outside peak hours in the morning and in the evening, at the following objectives:

- greater availability of the means of transport;
- shorter journey times;
- containment of service costs;
- possibility of increasing the number of stops, particularly near the city centre.

These objectives can be solved by implementing a Demand Responsive Transport service (considering a minibus)[16]. This solution is part of the MaaS mobility services[17]: specifically, the citizen downloads a free app and books a call in simple steps thanks to the location of his position and that of the bus; the driver receives the request on his tablet and his specific app activates the navigator that chooses in real time the best route to reach the user and to bring him to his destination, adapting the routes also according to any additional requests from other users.

The choice of vehicle on demand as an integration to the local transport system can improve connections between peripheral areas and areas currently lacking connection. This work shows a statistical survey carried out in the mountainous municipality of Enna located in the south of Italy, in the centre of Sicily. This city has been selected because some districts of the city are not well connected to each other and moreover this lack often does not allow the implementation of multimodality. The city of Enna was selected because it has a high rate of commuters (high school and university students and workers) who commute daily to/from Enna and who are not in possession of a private vehicle. In addition, the context is very critical with regard to the connection between the historical centre, the offices and the train station, and there are also serious shortcomings in the connection between the historical centre and the highly inhabited peripheral areas. A sample of xx inhabitants and xx commuters (workers and university students) was interviewed after the COVID-19 pandemic in order to understand what is the best solution to implement in the evaluated context, considering the current regulations that aim at social distancing to avoid contagion. Through a statistical analysis, the main factors influencing the choice of the on-demand bus in the examined area were analysed. The results obtained lay the foundations for the optimisation of local transport systems.

THE SPREAD OF DRT

The Demand Responsive Transport (DRT), Dial-a-Ride or even Paratransit is one of the sustainable mobility tools implemented in various realities to support local public transport systems. It consists in using a fleet of small vehicles (e.g. minibuses) such as to allow the carrying out of customized movements based on user requests (with origin and destination chosen from time to time) by managing the links between different routes with a certain level of flexibility to be able to satisfy all requests[18];in fact, users have the possibility to deviate from the planned route in order to accept unscheduled requests during the planning phase. This transportation system is very important for both reducing traffic congestion, environmental impact and providing transportation options to those with limited travel options [19].

The great advantage of this transport system is that passengers can be picked up or dropped off at a place and time specified by him/her.

Therefore, the non-use of this system could cause socio-economic difficulties, since the average age of the population is increasing, there would be an increase in the use of cars and there would inevitably be cuts in public spending that would threaten the use of traditional public transport [20].Gradually the perception of an economic benefit associated with owning a car will go into crisis and it will be much more convenient to rely on on-demand and / or self-driven services considering that with their progressive diffusion, they will become increasingly cheaper.

This leads to a green improvement, i.e. a better integration of transport systems, an incentive for sharing mobility and a reduction in the use of private vehicles, cost [21,22] and CO2 reduction[23].
A study conducted in England by Wang et al.[24] highlighted another important aspect. the DRT transport system is more likely to be used by disabled people who travel for work or who live in less densely populated areas. Over the past decade DRT services have grown for several reasons including:

- the deficiencies of normal bus and conventional taxi services;
- the deficiencies of special transport services;
- new developments in Community transport.

Traditional home calling services have often been criticized because of their relatively high cost, the lack of flexibility in route planning and their inability to handle all user requests [25].
Since the 1970s, the DRT has been promoted as a transportation solution in circumstances where traditional services are not economically viable, although a number of obstacles have prevented its widespread adoption [26].
The models used to manage these systems are also adaptable to the transport of goods, although with a slightly higher level of rigidity. In general, we try to satisfy two opposing needs:

- the minimization of operating costs (which can rise in the case of maximum possible flexibility);
- maximization of the level of service offered to the user (which decreases if the waiting or travel times become long).

To manage these systems, appropriate mathematical models and adequate technology are used, which also includes the use of systems and software products for service planning and management, GPS satellite systems for vehicle location (see Automatic Vehicle Location), telecommunication systems (based on private radio network or public GSM, GPRS, UMTS networks) GIS computer systems for the management of territorial information[27,28,29]

METHODOLOGY

The present research work has focused on a first analysis related to the propensity to use DRT in the local environment.in particular the flow chart in Figure 1 shows the different steps for the realization of the work.

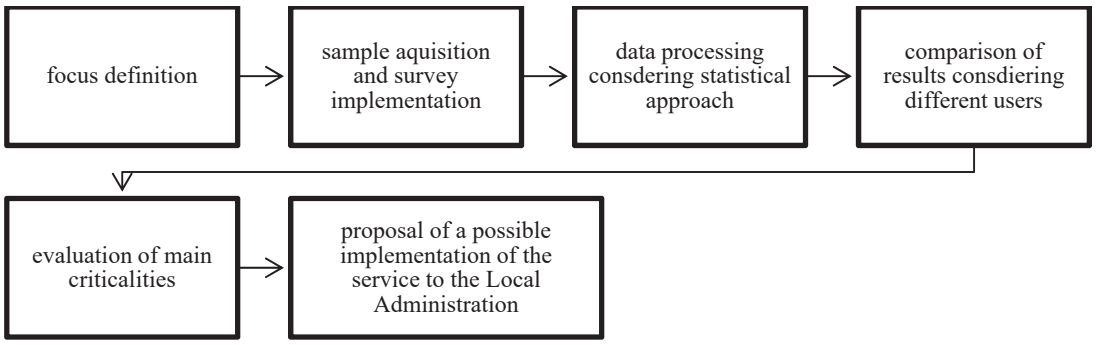

FIGURE 1. Flow chart of research

Through an online survey on Google platform it was possible to administer the survey to the resident and commuter population in June 2020. The survey was made up of three sections, one on socio-demographic data, the other on the possible propensity to DRT and the last one related to local critical issues that could push users to use the on-call bus. Table 1 summarizes the questions and related answers in closed form (single, double and/or on Likert scale [30]).

TABLE 1. Investigated Parameters of survey

section 1 scio-demographic section	**Gender (1a)**	**Age (1b)**	**Car ownership (1c)**	**Car driver (1d)**	**local bus use frequency (1e)**
	Male Female	<18 18-30 31-45 45-65 >65	Yes/No	Yes/No	Likert scale 1=never 5=always
section 2 DRT propensity	propensity to use the bus on demand for city/station connection (2a)	Likert scale 1= 5=	propensity to use the bus on demand for city / suburban connection (2b)	Likert scale 1= 5=	
section 3 Transport selection	selection of max 2 answers	Punctuality (3a)	Service management through apps (3b)	Type of vehicle used (3c)	Maintaining social distancing on board (3d)
		Problem related to car Parking allocation (3e)	The absence of a private vehicle (3f)	Cost-effectiveness of the service (3g)	Other (3h)

STUDY AREA DESCRIPTION

The Weak Demand Areas (ADD) are parts of the urban or interurban context, with low or medium-low transport demand and characterized by a considerable spatial and temporal dispersion. ADDs can be of different levels, in fact, both aggregates of municipalities or municipal areas.

The "weak demand" attribute is directly related to number of displacements generated by the area, but can also refer to the degree fragmentation of demand for which small groups - hamlets or houses sparse - generate low levels of demand for mobility. Levels of demand medium or high generated by a high number of fractions, however, imply that these are low demand.

The identification of ADDs must be carried out considering the presence within the municipal area of a large number of hamlets or scattered houses that need to be connected to the main city center of the Municipality (where, for example, shops, offices, nodes are located of transport). Some cases that can be classified as low demand areas are the mountain, rural and lowland municipalities with low and low population high dispersion, requiring lines with many stops and many routes. The context examined falls into this category In addition, it must be remembered that even urban areas that have low demand for mobility only at certain times of the day or periods of the year can be classified as low transport demand. More generally, situations that make public transport services inefficient and ineffective and for which it is possible to adopt more flexible forms of transport or to seek alternative mobility solutions. In accordance with [31] it can be seen that the growing demand for mobility and the shortcomings of the

transport system have turned urban centres into 'unlivable' places The prevalent use of private cars produces high levels of pollution, loss of life and road congestion. The promotion of public transport is seen as an effective strategy to make mobility more sustainable for people. When a public transport system serves areas with a weak transport demand, as is the case in areas with dispersed settlements (urban periphery, rural areas, mountains, ...), it is necessary to use demand responsive transport. The city of Enna is located in the center of Sicily at an altitude of around 970 meters above sea level It is characterised by about 27 thousand inhabitants and a population of commuters made up of 8 thousand students or almost 1000 workers. The expansion of the city has occurred in the last twenty years, making sure that the area of the historic center has remained characterized by the presence of tourist attractions and schools and offices instead the residential part, the university and the hospital has been distributed along the slopes.

The city, as Urban Master Plan, has a widespread distribution in the territory which, however, in some areas is not supported by an adequate public transport service. This is caused both by the presence of narrow roads and by the territorial distribution of the settlements which is widespread in several square kilometers. In order to facilitate travel, the resident population is almost totally equipped with a private car and often this affects vehicle flow, especially during peak times, leading to traffic congestion. In addition, there are numerous critical issues related to the number of parking spaces (lower than the circulating cars) and the absence of local public transport connecting the area of the railway station (about 6km from the historical centre) and the densely populated peripheral areas. The infrastructures are characterized by a high slope and the lanes dedicated to public transport or cyclists are absent . To date, the modes of transport present in the context examined are as follows

- local public transport (4 lines) distributed mostly along the main axes that connect the 3 large districts of the city called respectively Enna alta, Enna Bassa and Pergusa
- car sharing service active for about 1 year with the presence of 6 vehicle and 1 van and about 20 stalls distributed in the 3 districts mentioned above [32][33]
- bike-sharing active from July 2020 with around 30 bikes and 4 charging stations.
- taxi service with frequent use by the two population groups due to the high costs.

The population over 65 represents about 30% of the inhabitants and is characterized by a strong demand for moving from home to the hospital, medical offices and pharmacies. Some non-profit associations help the elderly in the aforementioned movement but the demand for service is greater and often this segment of the population does not use public transport for both getting on and off the vehicle and the absence of stops less than 200 m from the destination

FIGURE 2. Monitored area-Enna (Italy)

RESULTS

The study was preliminarily conducted by administering the questionnaire described above to 300 inhabitants of the city (group A) and 300 commuters, 150 university students + 150 workers (group B).The sample as a whole was well-balanced in terms of gender distribution, with 45% women and 55% men in group a and 49% women and 51% men in group b. With regard to the age groups interviewed, all over 18, the following distribution was obtained as shown in figure 3 for the two groups

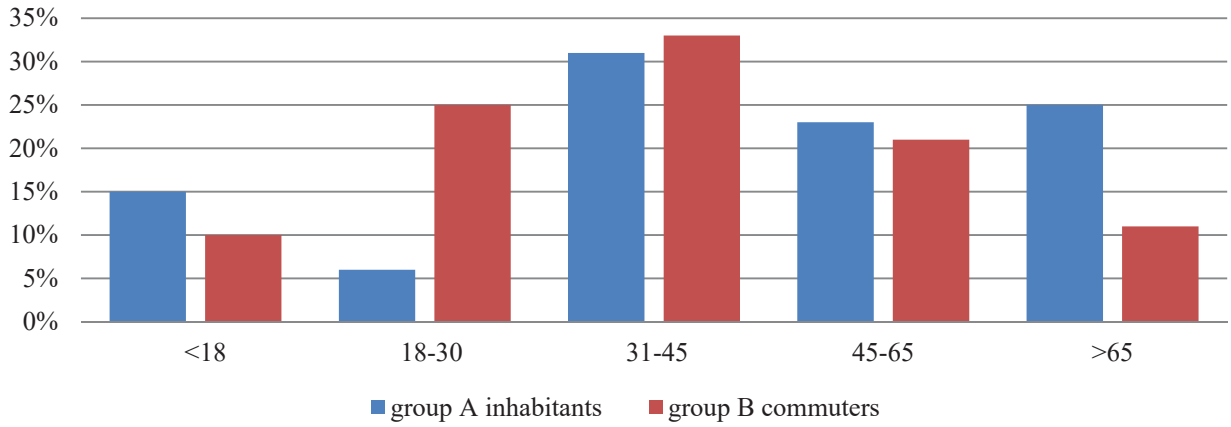

FIGURE 3. Age-related sample trend

As far as the possession of the car and the use for the two groups is concerned, the distribution shown in Figure 4 has been obtained, which shows that many commuters do not own a car. Moreover, as far as the inhabitants are concerned, the higher results also derive from the adaptation of the population to the need to move and the lack of transport services in the area.

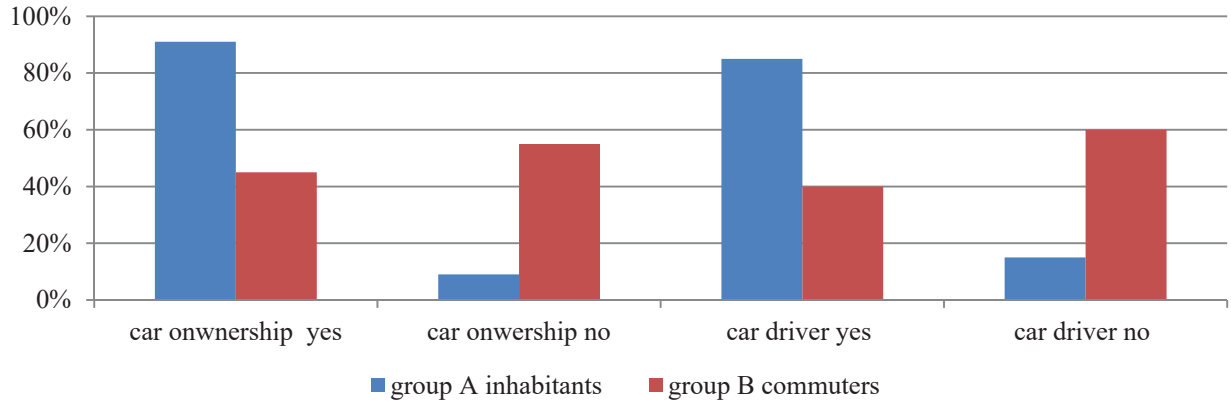

FIGURE 4. Car ownership and driving trends for the two groups A and B

The propensity to use the DRT bus has been expressed through Likert scale with judgements from 1 (completely disagree) to 5 (completely (agree) obtaining for the two groups and for the two hypothetical connections of the city to the train station and to the periphery as shown in figure 5

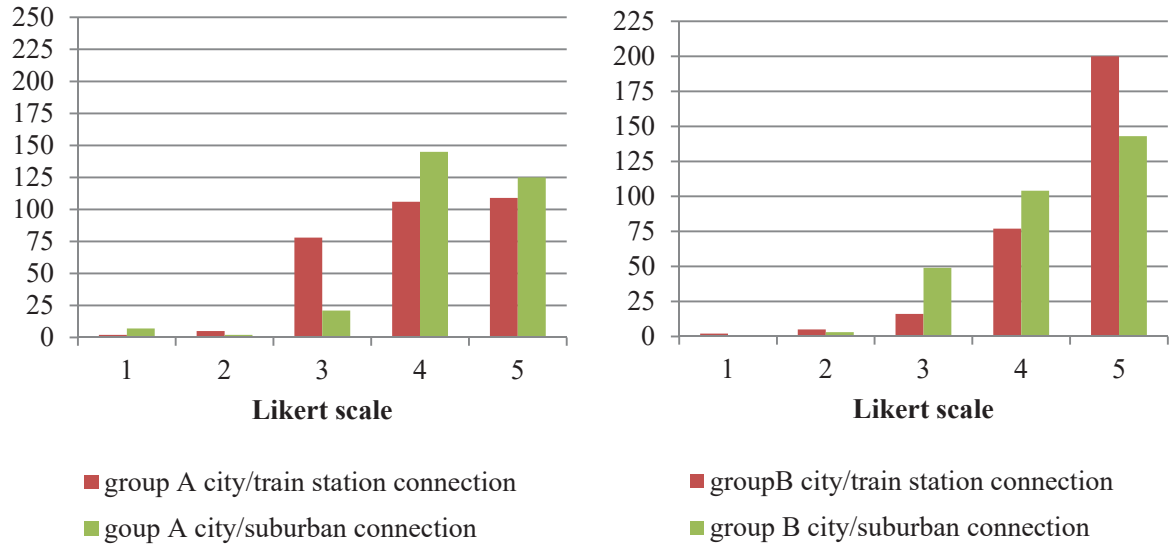

FIGURE 5. Distribution of connection preferences for group A (left) and B(right)

From the comparison of the judgements of the two groups we can see that the values of greater agreement to the realization of a minibus service on demand are related to the connection of the peripheral areas for the citizens instead for the connection with the station for commuters. This is plausible because the motivations of the movement are protracted for home-work, home school or leisure home for citizens while only for the home work or home school for commuters. For citizens there is also a similar distribution for the two destinations. The results are also influenced by the bad connection of the train station compared to other areas.

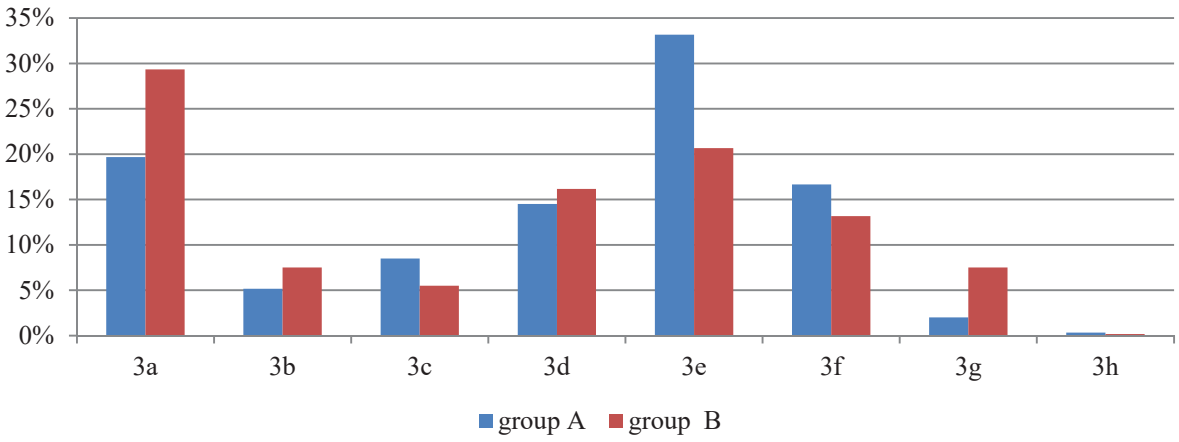

FIGURE 6. Opinions related to main factor that influence the use of DRT system

Finally, the parameters that influence the choice of the service for the two groups have been evaluated and compared; Figure 6 shows that the inhabitants have as the greatest problem to solve the criticality of the absence of parking spaces or the presence of parking spaces far from the areas to be reached; therefore, the use of the DRT could avoid the use of private vehicles, eliminating the problem of finding a stall for private cars. As far as group B is concerned, punctuality is the predominant factor of choice.

To date, several users complain about delays created by the lack of connection to the station or certain parts of the city and these delays also result from the lack of punctuality of the local transport service (on average 10-15 minutes). The dedicated DRT service could strongly reduce these times being on call and being able to take advantage of alternative routes. The variable that has had the least influence is the actual cost of the service for the inhabitants, which could be due to the fact that the population is willing to spend a little more due to the inefficiencies or criticality of public or shared transport systems. Moreover, in several cases it is impossible to travel medium distances on foot due to the absence of sidewalks. As far as group B is concerned, the factor that has recorded a smaller choice is the type of vehicle used.

CONCLUSION

The mobility of cities is progressing, increasingly considering a sustainable approach that allows the reduction of the use of private vehicles and the encouragement of walking or cycling for short distances and the use of shared mobility and DRT for medium and long distances. Although a number of strategies have been put in place to encourage the purchase of electric vehicles or the definition of single transport tickets, there are still a number of transport gaps in weaker users. In fact, the connection between different parts of a city is often critical due to local transport services and delays. Another cause is the lack of connection to peripheral areas with low demand. This work therefore investigates in advance the propensity of two population groups to use a DRT minibus, defining which variables may influence this choice of transport. The results lay the basis for further research steps with in-depth studies on pricing and route selection.

Author Contributions: Conceptualization, I.M. and T.C.; methodology, T.C.; software, G.T.; formal analysis, T.C.; investigation, I.M. and T.C..; resources and data curation, T.C.; writing—original draft preparation, I.M. and T.C.; writing—review and editing, I.M. visualization and supervision, G.T. All authors have read and agreed to the published version of the manuscript.

Funding: this research work was partially funded by the MIUR (Ministry of Education, Universities and Research [Italy]) through a project entitled WEAKI TRANSIT

Acknowledgments

The authors acknowledge financial support from the MIUR (Ministry of Education, Universities and Research [Italy]) through a project entitled WEAKI TRANSIT: WEAK-demand areas Innovative TRANsport Shared services for Italian Towns (Project code: 20174ARRHT /CUP Code: J74I19000320008), financed with the PRIN 2017 (Research Projects of National Relevance) program. We authorize the MIUR to reproduce and distribute reprints for Governmental purposes, notwithstanding any copyright notations thereon. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the MIUR.

REFERENCES

1. Acampa, G., Forte, F., & De Paola, P. (2020). BIM models and evaluations. In Values and Functions for Future Cities (pp. 351-363). Springer, Cham. https://doi.org/10.1007/978-3-030-23786-8_20
2. Acampa, G., Marino, G., & Ticali, D. (2019, December). Validation of infrastructures through BIM. In AIP Conference Proceedings (Vol. 2186, No. 1, p. 160011). AIP Publishing LLC. https://doi.org/10.1063/1.5138079
3. Campisi, T., Acampa, G., Marino, G., & Tesoriere, G. (2020). Cycling Master Plans in Italy: The I-BIM Feasibility Tool for Cost and Safety Assessments. Sustainability, 12(11), 4723. https://doi.org/10.3390/su12114723
4. Torrisi, V., Ignaccolo, M., & Inturri, G. (2018, May). Innovative transport systems to promote sustainable mobility: Developing the model architecture of a traffic control and supervisor system. In International Conference on Computational Science and Its Applications (pp. 622-638). Springer, Cham. https://doi.org/10.1007/978-3-319-95168-3_42

5. Torrisi, V., Ignaccolo, M., & Inturri, G. (2018). Toward a sustainable mobility through a dynamic real-time traffic monitoring, estimation and forecasting system: The RE.S.E.T. project. Town and Infrastructure Planning for Safety and Urban Quality - Proceedings of the 23rd International Conference on Living and Walking in Cities, LWC 2017, pp. 241-247. doi:10.1201/9781351173360-32 https://doi.org/10.1201/9781351173360-32
6. Torrisi, V., Ignaccolo, M., & Inturri, G. (2017). Analysis of road urban transport network capacity through a dynamic assignment model: validation of different measurement methods. Transportation Research Procedia, 27, 1026-1033. https://doi.org/10.1016/j.trpro.2017.12.135
7. Campisi, T., Canale, A., & Tesoriere, G. (2018, November). SWOT analysis for the implementation of spaces and pedestrian paths at the street markets of Palermo. In AIP Conference Proceedings (Vol. 2040, No. 1, p. 140003). AIP Publishing LLC. https://doi.org/10.1063/1.5079192
8. Campisi, T., Akgün, N., Ticali, D., & Tesoriere, G. (2020). Exploring Public Opinion on Personal Mobility Vehicle Use: A Case Study in Palermo, Italy. Sustainability, 12(13), 5460. https://doi.org/10.3390/su12135460
9. Campisi, T., Tesoriere, G., & Canale, A. (2017, November). Microsimulation approach for BRT system: The case study of urban turbo roundabout. In AIP Conference Proceedings (Vol. 1906, No. 1, p. 190005). AIP Publishing LLC. https://doi.org/10.1063/1.5012468
10. Gruden, C., Campisi, T., Canale, A., Tesoriere, G., & Sraml, M. (2019, September). A cross-study on video data gathering and microsimulation techniques to estimate pedestrian safety level in a confined space. In IOP Conference Series: Materials Science and Engineering (Vol. 603, No. 4, p. 042008). IOP Publishing. https://doi.org/10.1088/1757-899X/603/4/042008
11. Campisi, T., Canale, A., & Tesoriere, G. (2017, November). Study of emergency setting for urban facility using microsimulation tool. In AIP Conference Proceedings (Vol. 1906, No. 1, p. 190004). AIP Publishing LLC. https://doi.org/10.1063/1.5012467
12. Campisi, T., Canale, A., Tesoriere, G., Lovric, I., & Čutura, B. (2019). The Importance of Assessing the Level of Service in Confined Infrastructures: Some Considerations of the Old Ottoman Pedestrian Bridge of Mostar. Applied Sciences, 9(8), 1630. https://doi.org/10.3390/app9081630
13. Basbas, S., Campisi, T., Canale, A., Nikiforiadis, A., & Gruden, C. (2020). Pedestrian level of service assessment in an area close to an under-construction metro line in Thessaloniki, Greece. Transportation research procedia, 45, 95-102. https://doi.org/10.1016/j.trpro.2020.02.067
14. Campisi, T., Tesoriere, G., & Canale, A. (2018). The variability of Level Of Service and Surrogate Safety Assessment of urban turbo-roundabout with BRT system. JMEST Journal of Multidisciplinary Engineering Science and Technology.
15. Tesoriere, G., Campisi, T., Canale, A., & Zgrablić, T. (2018). The Surrogate Safety Appraisal of the Unconventional Elliptical and Turbo Roundabouts. Journal of Advanced Transportation, 2018. https://doi.org/10.1155/2018/2952074
16. Mulley, C., & Nelson, J. D. (2009). Flexible transport services: A new market opportunity for public transport. Research in Transportation Economics, 25(1), 39-45. https://doi.org/10.1016/j.retrec.2009.08.008
17. Canale, A., Tesoriere, G., & Campisi, T. (2019, December). The MAAS development as a mobility solution based on the individual needs of transport users. In AIP Conference Proceedings (Vol. 2186, No. 1, p. 160005). AIP Publishing LLC. https://doi.org/10.1063/1.5138073
18. Wang, C., Quddus, M., Enoch, M., Ryley, T., & Davison, L. (2014). Multilevel modelling of Demand Responsive Transport (DRT) trips in Greater Manchester based on area-wide socio-economic data. Transportation, 41(3), 589-610.https://doi.org/10.1007/s11116-013-9506-1
19. Ronald, N., Thompson, R., Haasz, J., & Winter, S. (2013, November). Determining the viability of a demand-responsive transport system under varying demand scenarios. In Proceedings of the Sixth ACM SIGSPATIAL International Workshop on Computational Transportation Science (pp. 7-12). https://doi.org/10.1145/2533828.2533831
20. Davison, L., Enoch, M., Ryley, T., Quddus, M., & Wang, C. (2014). A survey of demand responsive transport in Great Britain. Transport Policy, 31, 47-54.https://doi.org/10.1016/j.tranpol.2013.11.004

21. Kim, J. (2020). Assessment of the DRT System based on an Optimal Routing Strategy. Sustainability, 12(2), 714.https://doi.org/10.3390/su12020714
22. Dias, A., Telhada, J., & Carvalho, M. S. (2011). Economic evaluation of a demand responsive transport in rural areas.
23. Kim, W., Moon, N., & Kim, J. W. (2017). Fare estimation for demand responsive transport based on a stated preference survey. Transportation Research Procedia, 25, 5235-5241.https://doi.org/10.1016/j.trpro.2018.02.050
24. Wang, C., Quddus, M., Enoch, M., Ryley, T., & Davison, L. (2015). Exploring the propensity to travel by demand responsive transport in the rural area of Lincolnshire in England. Case Studies on Transport Policy, 3(2), 129-136.https://doi.org/10.1016/j.cstp.2014.12.006
25. Mageean, J., & Nelson, J. D. (2003). The evaluation of demand responsive transport services in Europe. Journal of Transport Geography, 11(4), 255-270.https://doi.org/10.1016/S0966-6923(03)00026-7
26. Davison, L., Enoch, M., Ryley, T., Quddus, M., & Wang, C. (2014). A survey of demand responsive transport in Great Britain. Transport Policy, 31, 47-54. https://doi.org/10.1016/j.tranpol.2013.11.004
27. Häme, L. (2013). Demand-responsive transport: models and algorithms.
28. Calabrò, G., Torrisi, V., Inturri, G., & Ignaccolo, M. (2020). Improving inbound logistic planning for large-scale real-world routing problems: a novel ant-colony simulation-based optimization. European Transport Research Review, 12, 1-11.https://doi.org/10.1186/s12544-020-00409-7
29. Torrisi, V., Ignaccolo, M., & Inturri, G. (2018, July). Toward a sustainable mobility through. A dynamic real-time traffic monitoring, estimation and forecasting system: The RE.SET project. In Town and Infrastructure Planning for Safety and Urban Quality: Proceedings of the XXIII International Conference on Living and Walking in Cities (LWC 2017), June 15-16, 2017, Brescia, Italy (p. 241). CRC Press. https://doi.org/10.1201/9781351173360-32
30. Joshi, A., Kale, S., Chandel, S., & Pal, D. K. (2015). Likert scale: Explored and explained. Current Journal of Applied Science and Technology, 396-403.https://doi.org/10.9734/BJAST/2015/14975
31. Campisi, T., Torrisi, V., Ignaccolo, M., Inturri, G., & Tesoriere, G. (2020). University propensity assessment to car sharing services using mixed survey data: the Italian case study of Enna city. Transportation Research Procedia, 47, 433-440.https://doi.org/10.1016/j.trpro.2020.03.155
32. Campisi,T;Ignaccolo,M.;Tesoriere,G; Inturri, G., & Torrisi, V. (2020). The evaluation of car sharing service attributes to raise acceptance of electric vehicles: Evidences from an Italian survey among university students (No. 2020-24-0021). SAE Technical Paper.ISSN: 0148-7191 24 (0021)