Participatory planning for better inclusive urbanism: Some consideration about infrastructural obstacles for people with different motor abilities

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Participatory Planning for Better Inclusive Urbanism: Some Consideration about Infrastructural Obstacles for People with Different Motor Abilities

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Abstract. The evolution of cities must not ignore the needs of specific population groups that need more help. In this way, urban development (such as the definition of SUMP) must consider the aspect of accessibility also through a participatory comparison with population groups that more than others can testify to their impediments during normal travel activities in the city. The research has focused on the calibration of a questionnaire and on the administration to a selected sample of users with motor disabilities by investigating, through the Likert judgement scales, the criticalities related to 3 elements present in urban spaces near road intersections: the sidewalk, the ramp and the traffic light. Through a statistical analysis, the judgements of two different groups of people with disabilities (wheelchair and walking stick/walker) have been compared and it was possible to compare the critical points, arriving at some useful considerations for the mitigation of impacts This work lays the foundations for a more in-depth investigation and the possible application of a transversal analysis to the same sample in the coming months, useful to evaluate how the vision of the problem has changed and at the same time to provide local administrations with some tools to evaluate the procedures for the removal of architectural barriers related to the elements analysed.

Keywords: sustainable city development,participatory planning,disabilities,cross sectional analysis

INTRODUCTION

The development strategy for cities after 2020 must be increasingly based on achieving territorial and social cohesion capable of leading a community towards growth that is accessible to all and of a shared type.

This will be possible through the pursuit of a pathway that winds through the definition of different strategies such as the fight against poverty and inequality, support for training and the expansion of skills, the restoration of the framework of an open and dynamic, but above all truly democratic, society.

These results on the economic and social level are reflected in the design of an urban space without physical and cultural barriers, through the inclusion of places of encounter and confrontation, not only in established areas of the city, but also and above all in peripheral areas that most need such attention. Democratic participation in the planning process can take place by considering different population groups linked to the city's different criticalities[1,2,3,4] The city after catastrophic and pandemic events such as the recent COVID-19 needs urban planning that implements integrated design assessment approaches and models, especially for sustainable structures or infrastructures, that are possible through the use of BIM and IBIM models that allow to consider the design part

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together with costs and safety[5,6] Urban mobility is also one of the themes that involves different types of users in the definition of transport demand, different for socio-demographic aspects or for reasons of displacement. In accordance with [7]among the strategies that allow for improvement in cities is the pursuit of resilience at all levels of urban intervention, involving municipal authorities, architects and urban planners, companies and businesses, citizens and communities. In this sense, urban governance must set specific objectives and targets to create a smart and sustainable city.

The study of mobility can be addressed directly or indirectly: in the first case it is necessary to evaluate the travel habits of the users and this is simple if we assume an implementation of ITS sensors able to monitor in real time the different movements [8,9,10,11,12] or remodulate the traffic light systems with specific sensors [13,14] or cameras [15] or considering mobility as a service[16] able to make the user select the best travel choice or through the administration of questionnaires or interviews allows to know the peculiarities of the users of a particular type of service or mode of transport[17] Indirectly it is possible to plan considering SWOT analysis[18] and monitor transport demand through the definition and estimation of some walkability[19,20]accessibility [21] or through level of service (LOS)[22,23] In the literature there are different approaches related to longitudinal or transversal analysis or to the evaluation of the dependence between variables related to the mobility of persons. With reference to the weaker sections of the population, it is essential to evaluate in a preventive manner the obstacles that people with disabilities may encounter when travelling or booking a service. Today planning and design must involve the participation of the population in order to analyse and mitigate the criticalities that residents of an area usually experience, using public spaces. In the case of disability, the criticality has further increased, especially during the travel phase. In the case of disability the criticality is further increased especially during the displacement phase. In accordance with [24]the implementation of holistic urban plans incorporating transport infrastructure, public space and people's behaviour in these spaces, the integration of urban design and computer modelling is a promising way to provide both qualitative and quantitative support to decision makers. This work focuses on a first qualitative-quantitative analysis related to a group of people of legal age who need to use a wheelchair in order to move. An inclusive city, an equal city, is proposed as a welcoming, safe and suitable place for everyone's needs: the protagonists of the project are therefore all citizens, specifically the carriers of sensitivity and direct experience. The solutions in fact are many, but the best solution, situations that are really functional to inclusion, can only arise from the comparison [25].

METHODOLOGY

The research aims to analyze the parameters that allow to build a model for the inclusive city starting from the cultural approach on them disability, reversing the welfarist vision towards a sustainable development perspective, working for an environment that creates autonomy, security, inclusion, as the only possible route to a new balance of communities. The methodology adopted, of statistical type, has a national value. The multi item ladder technique was invented in 1932 by the American psychologist Rensis Likert [26] with the aim of developing a new instrument, more simple compared to others, for the measurement of opinions and attitudes. Likert's scales are the simplest and most intuitive literature as additive scales or better summate drating scales. They are the simplest and most intuitive presented in the literature: given a series of statements, yes asks the respondent if and to what extent he agrees. This work shows how the first and second of three main research phases were developed. The first step of evaluation in fact required the direct participation of the population with disabilities, defining at first a working table open to the social categories interested in the themes of urban inclusiveness and aimed at systematizing and networking instances and suggestions The second phase was characterised by the administration of the questionnaire .

This activity was aimed at the recognition of the critical issues related to some open spaces in the city and the resolution of the specific criticality expressed. The monitoring phase of the activities and the methodological approach will guarantee a continuous and always new value to the project.

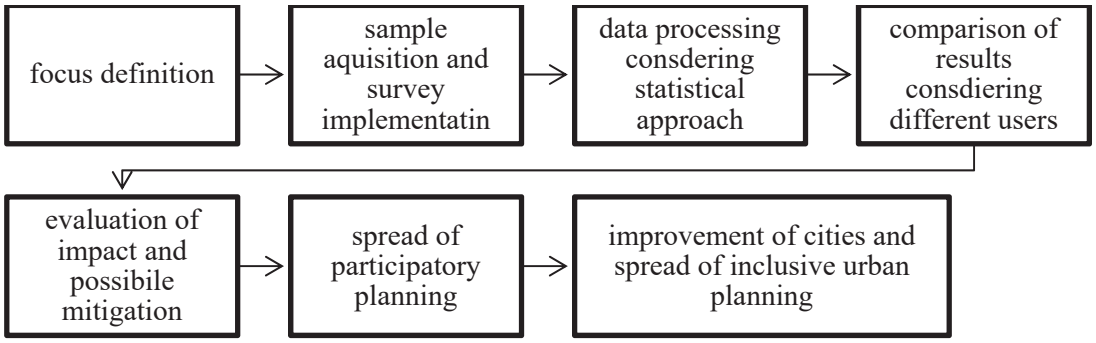

FIGURE 1. Research flow chart

RESULTS

The sample investigated is made up of adults with the same disability that requires the use of a wheelchair to be able to move. The survey campaign was carried out in January 2020 through the administration of a questionnaire to the population of a small mountainous urban centre in the centre of Sicily (Enna). The questionnaire was composed of two sections. The first with socio-cultural data and the second with aspects related to the criticality of three different infrastructural elements, namely

- the sidewalk
- ramps
- the traffic light

The sample has been selected thanks to the collaboration of non-profit associations that help people with motor disabilities (140 units). Questionnaire showed that the sample was heterogeneous from the point of view of gender and age most of the respondents are between 26 and 45 years old as shown by the figures below.

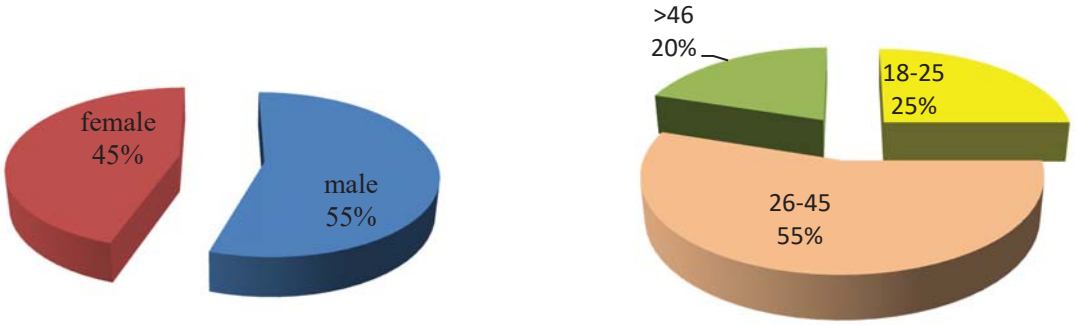

FIGURE 2. Socio-demographic distribution related to gender (left) and age (right)

The second section allowed to investigate 6 parameters related to the pavement,4 parameters related to ramps and 3 to traffic lights. All the variables investigated are geometrically functional and closely related to the design of roads in urban areas. These parameters also allow to evaluate, through their absence or negative judgment, the presence of architectural barriers .so through these criticality evaluations it is possible to bring out some considerations that can be useful to mitigate or reduce critical points during the planning and design of urban spaces. For each parameter afferent to the 3 functional geometric elements a judgement has been expressed from 1 to 5 where 1 expresses that it does not influence at all the movement while 5 that strongly influences. Considering the critical issues related to the width of the pavement and the excessive gradient, it is clear that wheelchair users (figure 2 left) have expressed a greater consensus that the width of the pavement is a critical point of the infrastructure,

whereas for people walking with a walking stick and a walker (figure 2 right), the opinion is slightly lower and remains similar for the two infrastructure issues as can be seen below:

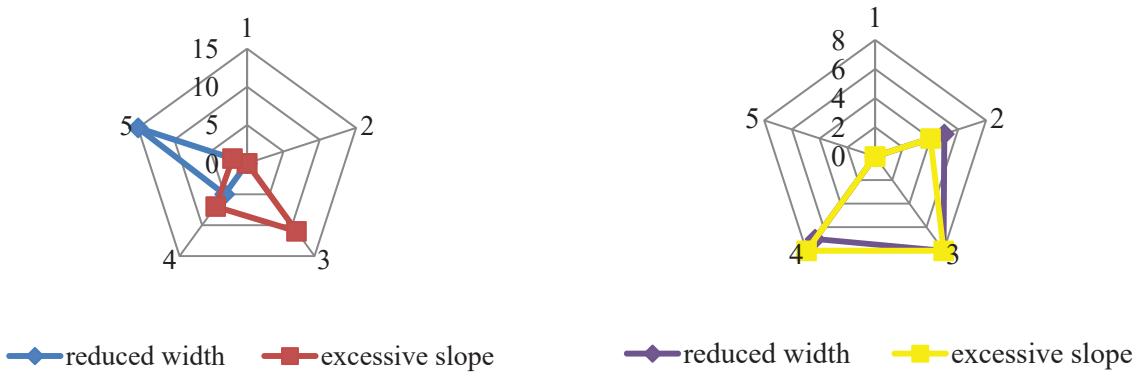

FIGURE 3. Distribution of opinion related to sidewalk considering wheelchairs (left) and walking stick/walker (right)

Approximately 75% of the sample in the wheelchair gave a grade of 5 for the reduction of the width of the pavement, while 40% of the people with a stick gave a grade of 4 to 3. With regard to the excess gradient, about 55% of people in wheelchairs cast a grade of 3, while for the same variable, about 50% of people with a wheelchair/walker cast a grade of 3 and 4. Judgements regarding the presence of obstacles on the pavement and the absence of limits were also assessed and compared as shown in figure 4 on the left for those using the wheelchair and on the right for those using the cane / walker.

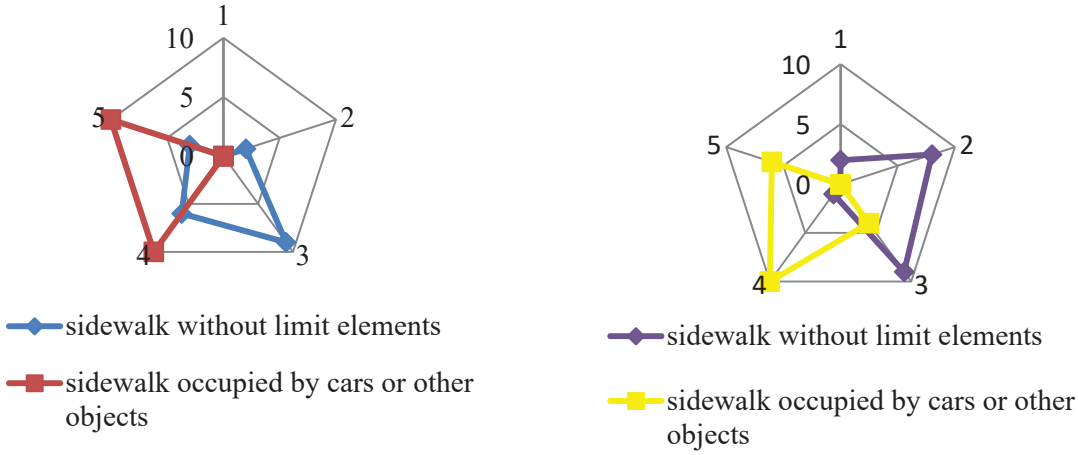

FIGURE 4. Judgments related to sidewalk and relative parameters for wheelchairs (left) and sticks (right)

Finally, as far as the sidewalk is concerned, judgements have been made about the absence of handrails, which is more critical for those who use a walking stick and walker, and the presence of drainage channels adjacent to the sidewalk that present an element of discontinuity to the surface and a possible element of disturbance and slippage for those who move with the two different types of mobility aid like described on figures below.

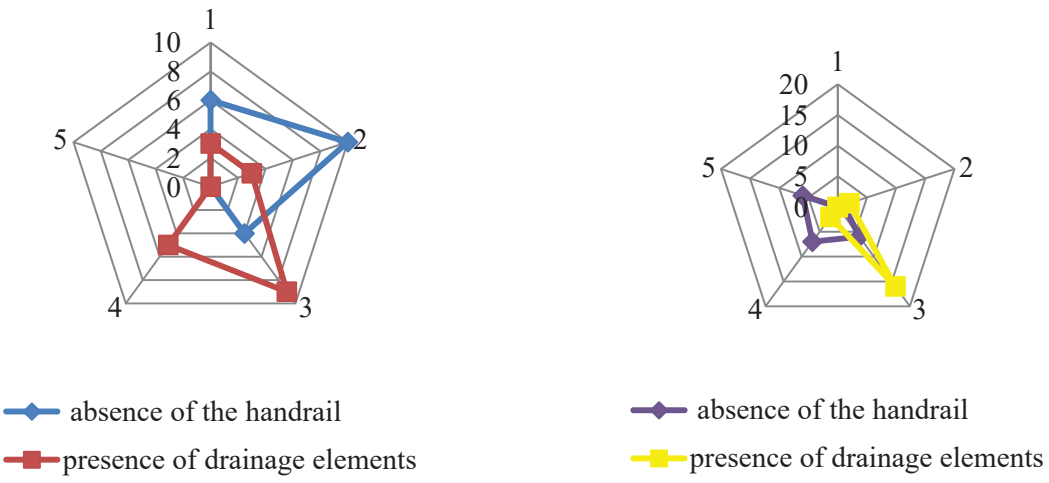

FIGURE 5. Judgments related to sidewalk and relative parameters for wheelchairs (left) and sticks (right)

As far as the ramps are concerned, 4 aspects have been evaluated: no up/down ramps from the sidewalk and the unsuitable ramps (too steep a slope, ramp too narrow...) obtaining the distribution of the judgements represented in figure 6 on the left for people in wheelchairs and on the right for people using the stick/walker.

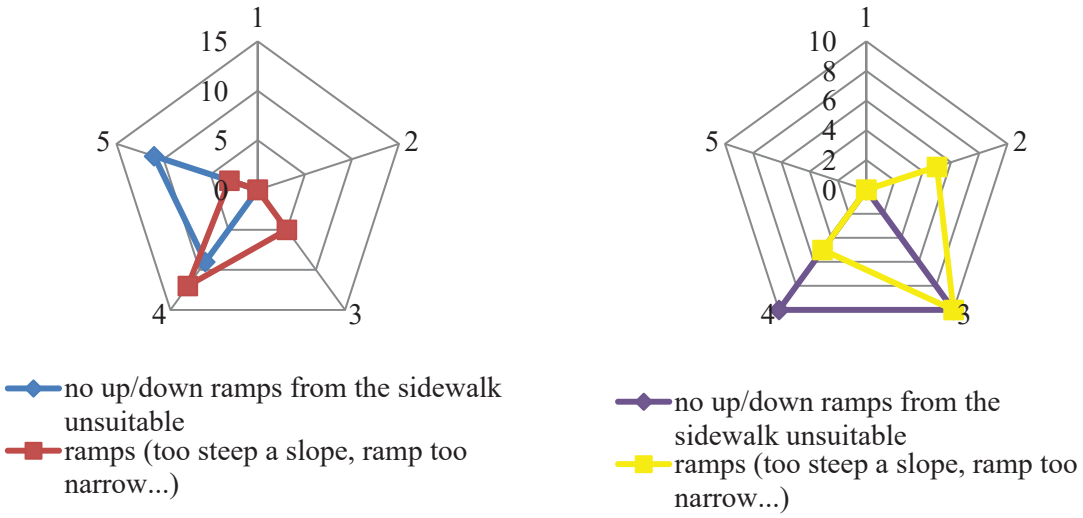

FIGURE 6. Judgments related to ramps and relative parameters for wheelchairs (left) and sticks (right)

The other two parameters related to the ramps and judged were the presence of the handrail and the possible presence of obstacles obtaining the distributions shown in figures 7 and 8

Also, in this case the presence of handrails was more necessary for those who move with the stick and also for the same category were recorded judgments with greater impact for the obstacles present on the ramp.

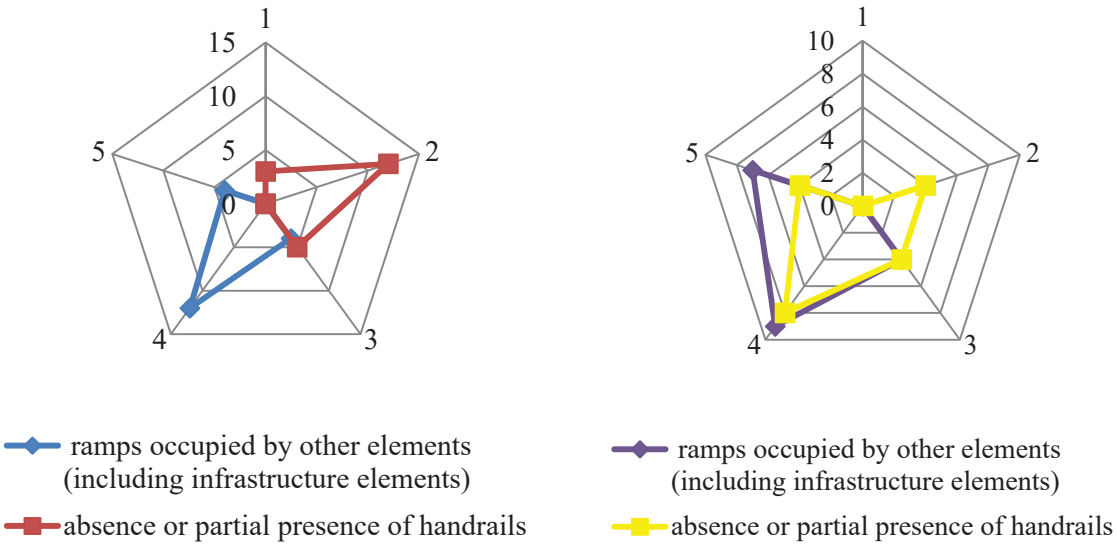

FIGURE 7. Judgments related to ramps and relative parameters for wheelchairs (left) and sticks (right)

As far as the traffic lights are concerned, the green times, the presence of a tactile plane and the absence of roadside signs have been evaluated as shown in figure 8.

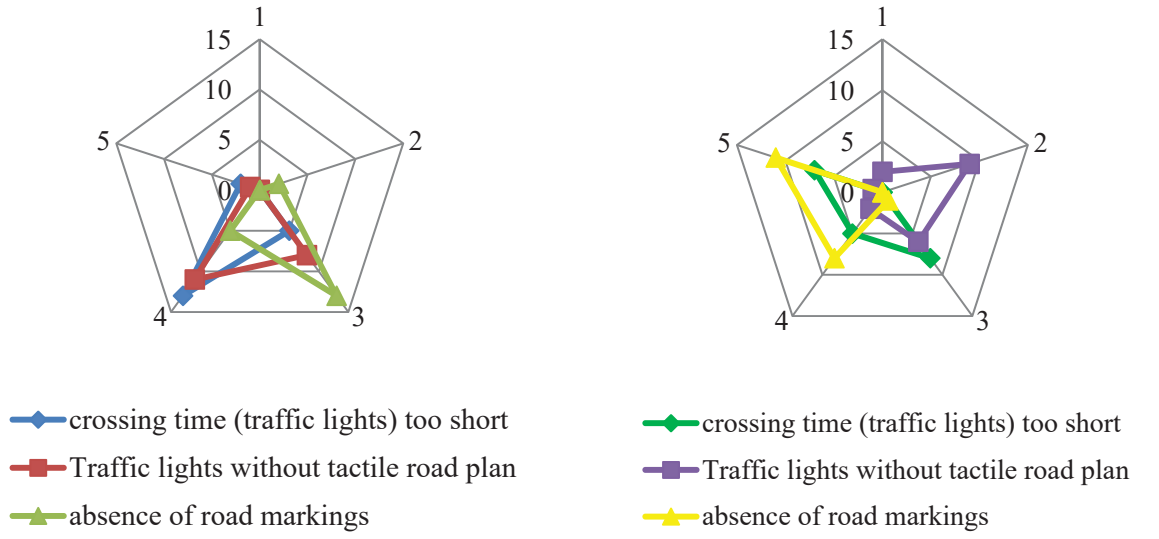

FIGURE 8. Judgments related to traffic light and relative parameters for wheelchairs (left) and sticks (right)

Considering people with wheelchairs about 65 % rated the green time as 4 and the same percentage as 3 for the absence of road markings, while 55% rated the absence of a tactile path as 4. As regards the areas near traffic lights for sticks and walker users, it was obtained that about 55% expressed a vote equal to 5 for the absence of signs, about 45% expressed a vote equal to 2 for the absence of tactile plan while about 30% expressed a vote equal to 3 for the green light time.

CONCLUSION

The open an public spaces of the city today show several critical points that are often difficult to overcome by people with motor disabilities.

An urban planning based on accessibility and removal of architectural barriers requires a collaboration between the Local Administration and the citizens.

In this way it is possible to bring out the negativity of the different spaces as the types of users and motor skills vary.

The present work represents a first step of statistical investigation useful for the mitigation of the impacts created by some elements that characterize the open spaces of the city and in particular the streets.

Through the administration of questionnaires, it has been possible to investigate the criticality and the variation of impacts that some areas of the city, in particular the area of road junctions, assume when motor disability varies.

The results obtained are preparatory to the analysis of impact mitigation and the dissemination of participatory planning that can help local governments to make the best choices for a more inclusive and liveable city. In fact, the results obtained will be expanded, increasing the survey sample and the variables to be investigated, but it immediately offers a tool for understanding the critical points of the city and for the implementation of strategies aimed at the removal of architectural barriers starting from elements such as widths and slopes to make the use of the sidewalk accessible to all. These critical points concern, in fact, not only those who have problems with motor disabilities but also women with wheelchairs and the elderly. The results allow us to hypothesize some short and medium-term strategies to be implemented in the context examined. In particular, the correct positioning of street furniture can facilitate the movement of people, making sure that the elements themselves do not become an obstacle and the presence of handrails can facilitate the ascent and descent of ramps and sidewalks.

A correct design of the traffic light plan that takes into account pedestrian flows and the different types of population (children, elderly, people with disabilities) will allow greater safety during the crossing phase as well as the presence of signs on the roadside near crossings. Finally, the establishment of a tactile plan near the intersection or slope change zones allows better recognition of areas and facilitates movement.

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.and M.F.E.; writing—original draft preparation, I.M. and T.C.; writing—review and editing, I.M. visualization and supervision, M.F.E. and G.T. All authors have read and agreed to the published version of the manuscript.

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