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ORIGINAL ARTICLE

Public engagement in urban innovation: towards the concept of inclusive mobility

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ABSTRACT

In the process towards smart city, the concept of public transportation has evolved as a set of socio-material entanglements by highlighting the social impacts. This research offers a community-based approach to identify criteria for the design towards inclusive mobility by setting a validation model to measure and extract collected stakeholders' data. The study provides a thematization of optimizing strategies to address mobility in future smart city actions towards sustainable community development, aiming to inspire further research in Italy and beyond.

Keywords: Public engagement; smart city; validation.

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Introduction

With the emerging academic concentration on the "Smart City" planning, the application of big data and Information and Communication Technology (ICT) is a more popular way to arm spaces with smart functions (Kitchin, 2014). Despite the increasing focus on inclusive and sustainable urban planning by communicative and collaborative approaches (Ponzini and Rossi, 2010), many smart technologies involved projects, such as smart mobility, are still facing tremendous public participation challenges and await suitable strategies (Coscia and Curto, 2017; Spacca et al., 2018). Thus, involving the community into the decision of setting up smart mobility, in order to build an inclusive and sustainable process towards innovation, is one of the most important challenges we are facing.

This work presents an experiment to enhance public participation in smart mobility contexts using online interviews and surveys and proposing a methodology to identify criteria during the decision-making process of setting an inclusive mobility.

Background

Giffinger illustrates that a smart city is built on the smart combination of activities of self-decisive, independent and aware citizens (Giffinger al., 2007; Caragliu, 2011). Smart city implementation achieves benefits from efficient communication among all the potential stakeholders it may concern (Amoroso et al., 2010). ICT is one of the crucial instruments aimed at involving citizens to participate in city governance, obviously plays an important role in the process of public transportation towards smart mobility (Clara, 2016). Challenge of smart mobility innovations might lay the groundwork for strengthening coordination to enhance governance capacity (Diane, 2018).

Indeed, public participation has become a hot topic since the 1970s. Innes and Patsy Healey developed a series of theories, including communicative and collaborative planning (Healey, 1997; Innes and Booher, 1999). The significance of media to provide an intermediary for citizens to actively participate in planning and joint decision-making process has been highlighted as two-way and reciprocal intercourse (Healey, 1997; Innes and Booher, 2004). The internet as a social media is now a key community-based platform for sustainable and inclusive urban design (Innes and Booher, 2004). It fosters an open culture wherein strong-motivated people can get involved in the development of the underlying infrastructure, and everyone has the opportunity to be seen and heard, and to contribute to collaborative planning (Kitchin and Dodge, 2011).

In this digital era, the use of the ICTs is strongly influencing civic engagement, much more than traditional print and broadcast media and face-to-face communication do (Shah et al., 2005; Castells, 2013). In particular, to apply social media apps, such as Twitter, Facebook, Instagram on the collection of users' information is becoming a hot topic in the academic field

(Hawelka et al., 2014; Jong, 2015; Boy and Uitermark, 2017; Rose and Willis, 2018). Some researchers show misgivings that the new digital platform has mainly been used for dissemination of information rendering it an elitist rather than a democratic tool (Blumenfield and Silverman, 2013; Cheng et al., 2017). However, on the other side, abundant scholars aligned and are contributing on "how intelligent technologies can lead us to rethink the patterns of urban development by making them […] efficient and sustainable" addressing different context (Bencardino and Greco, 2014; Ratti and Claudel, 2016; Riva Sanseverino et al., 2018).

There is acknowledgment that smart mobility is only one of the topics among smart economy, smart environment, etc. regarding the Smart City implementation (Amoroso et al., 2010). This paper restricts the sphere of mobility to public transportation. Technologies such as shared mobility have been proposed in the mobility innovation projects to enhance the connection between different public transportation (Goodwin, 2012; Dowling and Simpson, 2013; Dowling, 2018). Nevertheless, there are only a few practices involving citizens taking part in the decision process of setting such mobility. One of the few practices is the smart bicycle systems settled in London, 2004 (Noland and Ishaque, 2006).

The application of ICT in the community participation is still relatively young. More quantitative studies and practices should be conducted to offer experimental information based on various socio-cultural, as well as geospatial, context.

METHOD AND DATA

For inclusive mobility we develop a methodology consisting of five steps, mainly based on the exploitation of public participation. Needs, concerns, ideas, and feedback are used to define the intervention strategy and to validate each step of our methodology.

Step 1: Stakeholder analysis

We started by conducting an extensive analysis of potential mobility stakeholder: users of the train station and mobility services; the station workers: employees of the mobility operators, and services industry (e.g. shops and restaurants); secondary mobility operators beyond National Railway Operator (e.g. taxi, local bus services, bike sharing services…); institutional entities such as neighborhood association, regulators, city halls and government entities.

This first step of our methodology plays a key role in targeting people involved in the participative decision process.

Step 2: Interviews

We interviewed 30 people, carefully selected to cover the whole stakeholder map and to grasp the ideas from not only the powerful stakeholders but also common users. The entire interview process lasts one month aiming at the determination of mobility-related perceived problems in the users' perspective. We interviewed people vis-à-vis in the train stations (mostly in Turin, Italy), via telephone, as well as social media.

A deep and detailed communication with users is necessary to avoid biases and force them to talk about possible problems when they travel by train. The obstacle to identifying the users' concerns is to guide people to think more about their feelings and secondary problems instead of only focusing on transportation problems.

Step 3: Pillars hypothesis

We obtain three major trends from the interviews: *the difficulty of reaching and leaving from the train station the need for information, and human contact.* They constitute the basic assumptions (pillars), and the key points for innovation in mobility. The exact process in extracting the three pillars from the interview results are postponed to the result section.

Step 4: Validation of pillars

To clarify the requests of all the stakeholders we validate the assumption of the pillars by exploiting the power of public participation. We prepared a questionnaire on "Google Modules" and spread it online. The survey was meant to falsify any eventual bias or misconception which could possibly affect the underlying hypothesis, outlining and verifying the validity of the real solid pillars.

The choice of questions was in line with the pillars. Concerning 'human contact', we investigated what people do during commuting, and we went further by probing their feelings on human interaction during traveling. A quantitative description is requested regarding the perception.

For the 'information' pillar, we examined the necessity of having continuous/real-time updates of transportation (e.g. the effective train position and delay) and information about station services.

Concerning the last pillar, we studied how people reach and leave the station, to understand the first-last mile problem perceived by the user.

The responses of the survey are shown as following in the result section, in which we also make a comparison with the initial problem statement as a means of validation.

Tab. 1. The response of interviews.

Issue	Interview response
Accessibility	30.0 %
Ambient embedding	20.0 %
Connectivity	13.3 %
First/Last mile improvement	53.3 %
Human Interaction	20.0 %
Information	43.3 %
Services	26.7 %
Stress problematics	16.7 %
Time efficiency	13.3 %

Step 5: Road definition confirmation

A possible innovative roadmap is defined and it is validated, again, through direct interviews with possible customers and users.

We planned the realization of a pilot digital platform allowing train travellers easy access to real-time information; improve the human connection among travellers, (matching people based on their personal interest); solve the issue of the first and last mile guiding people towards the concept of shared mobility. We dedicated two days in the Geneva communicating with persons from different contexts (gender, age, nationalities, etc.) aiming to validate the idea.

Results

We collect, analyze, and classify the feedbacks of the previous survey, both online and offline interview, into nine major categories:

- Improvement of the transportation *accessibility*, considering the special needs of disabled persons, language problem of foreigners, as well as luggage obtain;
- Special considerations for the *station ambience,* regarding weather conditions, moving possibilities, safety and security of places;
- Enhance *connectivity* between small villages and big towns, and among stations and surrounded neighborhood activities (i.e. stores and services);
- The need for sharing mobility, requested by a stronger link between the space gaps of public transportation, *first/last mile transportation*;
- The need for *human interaction* in and around the station, strengthened by the loneliness feeling of travelers;
- The need for travel-related and touristic *information* while moving;

Tab. 2. Pillar-interview connection.

Issue	Information	Human contact	First/last mile
Accessibility	x	x	
Ambient embedding	x	x	
Connectivity	x		x
First/Last mile improvement	x		x
Human Interaction		x	
Information	x		x
Services	x	x	
Stress problematics		x	x
Time concept	x		x

- Needs for extra *services* within the station; the attempt to reduce the use of private car, towards *less stressing transport* in the city, as we as a more environmental friendly context;
- The improvement of *time efficiency*, to reduce inactive and useless time lags according to travelers' schedule.

Tab. 1 shows the distribution of issues arising from the interviews. The figures lead us to the conclusion that the concern on the *first/last mile improvement* and *information* occupied the first two positions far beyond the rests. The minor pillar *human contact* shows up as mainly connected with *accessibility* and *human interaction*. These three pillars enable the connection with all the categories we have mentioned, according to Tab. 2, formally stated as the human contact, the need to constantly seeking updated information and the practical difficulty of reaching and leaving the train stations.

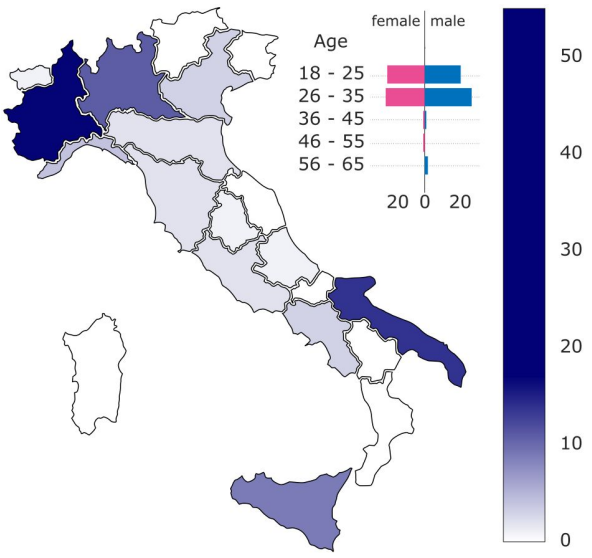

Fig. 1. Survey sample population distribution

Tab. 3. *First/last mile issue analysis how do you reach (first mile) and leave (last mile) the station? (multiple choice was possible)*

Response	First mile	Last mile
On foot	45 %	47 %
Public transportation	46 %	63 %
Private bike	5 %	0 %
Private car	39 %	18 %
Taxi	5 %	9 %
Sharing	8 %	5 %

Following the methodology, in step 4 the pillars are validated through an online survey which has been spread on the Italian population using social websites (Facebook). Fig. 1 shows the distribution of survey responses (109 samples) which is very focused to people in the range of 18-35 years old, equally distributed on the two genders and mostly concentrated in Piedmont, as the geographic research base, Lombardy and Apulia.

With the aim of validating the pillar regarding the first and last mile transportation, we asked travellers to tell how they reach and leave the station. Tab. 3 reports the response to the questions. The use of a private car is still persistent and comparable with less polluting solutions, against environmental sustainability. Nevertheless, there is a very good attitude and interest in using alternatives (eg. public transportation, taxi, sharing mobility, on foot), coherent with our expectation. It is worth noticing there is asymmetry and a correlation in the responses in public transportation and in private car: many travelers use cars for the first mile, moving with public transportation in the last mile. This implies that commuters are willing to use public transportation which is not currently equally distributed in urban, suburban and rural areas. This evidence was also highlighted during our interview procedure.

Concerning the necessity of continuous information updates, travelers were asked to give a value describing their perception (0 is negative, 5 is affirmative) addressing several different scenarios. As shown in Tab. 4, the importance of continuous updates is clear (the average response is 4.49/5.00). Moreover, it is worth noticing how a possible human help in the station would be appreciated, providing an important connection between the second and the third pillar.

Tab. 4. *Information issue analysis.*

Answer	Average response on a [0-5] scale
Would you appreciate finding somebody in the station helping you?	2.95
Would you appreciate having a navigator in train stations?	3.46
How important is for you to have continuous updates about transportation status?	4.49

Tab. 5. *Human contact issue analysis*

Answer	Average response on a [0-5] scale
How often do you travel alone?	3.63
How important is to have some company?	2.17
Would you appreciate to have company in the station?	2.60
Would you like to share your travel with people having similar interests?	2.92

Finally, Tab. 5 reports the responses to the questions regarding the *human contact* pillar. Although travelling alone is common nowadays, there is a tendency in appreciating to be accompanied by someone. Notwithstanding the obtained perception on the third pillar is less strong than the previous ones, we can see that the two questions regarding the companions lead to a positive answer. The minor pillar might be an open point for the innovation: the perception of the problem from the user perspective is still low, which can lead to future innovation in mobility, leveraging on unsolved discomfort and inefficiencies in the user experience.

In conclusion, we identified three important aspects of this approach: firstly, the connection between current transportation systems is not tight enough for travellers, as well as commuters; secondly, there is an urgent request for real-time updated information, which is stated as one of the main reasons to increase travel-related mental stress; thirdly, the questionnaires demonstrate that travellers the opportunity to spend time on facilitating working activities and improving the human connection among people.

Discussion and Conclusion

Information and Communication Technology (ICT), and social networks demonstrate great potential to foster the development of smart cities. We focused on building a strategy to involve public participation in the decision process of an inclusive mobility system on the digital platform. There are several interesting findings emerged in this research.

Through the literature review, we found out that although public participation is highly required in the process towards the smart city, only a few practical contributions have been settled, especially in the mobility sector. Thus, we built an assessment framework to collect, analyze, and validate relevant stakeholders' data, as a bottom-up approach, aiming to contribute an experimental examination of community engagement in the digital era.

Eventually, we validated the methodology by realizing a digital platform which consists of a virtual

interface that provides easier access to real-time information; increases the possibility to meet travel partners with similar interests; proposes possible solutions to facilitate the connection between different transportation systems.

In the meantime, we validated the idea by performing interviews in Geneva train stations and in CERN. The feedbacks were surprised as they show a noticeable interest in this application. In particular, the human pillar, so far considered as the less important, appeared to be the most important one for this innovation project. For instance, immigrants would really appreciate using the application to find companions that might help them visiting and settling in the city. This demonstrates an effective innovation can be developed on the idea of the three pillars and validates the methodology we used to analyze the problem.

Finally, the results demonstrate the feasibility of public engagement methodology in the decision process of innovative urban innovation and encourage future research to explore the associated implications in the process of urban planning.

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