Collaborative Soft Mobility Planning for University Cities: the Case of Pavia

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Abstract

One of the main aspects to describe the relationship between University and City is studying the material and intangible relationships (typology, unit of measurement, quantity) among the different elements, subjects and places involved and therefore analysing the role that the university system assumes with respect to the urban system. University City, in fact, means a specific urban structure characterized by the maximum expression of the relations system (social, environmental, economic) that can exist between university institution and administrative/political institution: in particular, the physical connections linked to the spatial location of university structures within the urban fabric.

Historically, in Italy, universities were not organized in a specific building type but the extremely professional characteristics brought them closer to the city community and, consequently, allowed them to assume the same morphology of the urban fabric around. Some cities have emphasized their being University Cities over time, including Pavia. With just over 71,000 inhabitants and 22,000 university students in a ratio of 3.22, city and university have always evolved and transformed themselves in an organic, though often uncoordinated, way.

The need to implement forms of sustainable mobility aimed at improving the connections between university and city center, useful also to trigger deep urban regeneration processes, carried to experiment a collaborative planning process between university, municipality and the main involved stakeholders. The main aim is to develop an overall strategy throughout the entire municipal territory and to define lines of actions (tactics) for the creation of a soft mobility network within the Pavia context as University City. The participatory process is implemented with the use of a Collaborative Planning tool based on Google functionalities. In the paper, authors describe the main elements of this project.

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1. Introduction

As institutions of high culture, and as bodies responsible for higher education, universities are made up of a set of scientific structures aimed at teaching, scientific researching and transferring of knowledge. The inner organization of the university system is determined by the complexity and variation of relation with the physical and immaterial territorial and urban context (Mambriani, 1999; Martinelli et al, 2012 and 2013). Cities are an important space of connection between society and university with different implementation methods and times (Bender, 1988); historically, universities are born in urban contexts, and, as they develop, they interact with the city becoming an integral part of it. University cities, usually characterized by the presence of historic universities, are the expression of a factual interaction that is not always determined by intentional choices or long-term planning. In all the urban area, the scattered presence of university elements (buildings for didactic activities, laboratory, offices, colleges, canteen and so on) allows to have an active urban fabric, with people, goods and ideas flows, eager to renew itself and to remain connected with the different parts of the city (residential districts or strategic elements as hospital, railway station, etc.).

This is the physical and relational structure of Pavia.

The main goal of the research is the description of the cultural context, the physical characteristics and the social and economic boundaries underneath the development and implementation of the physical links among university and city elements, and therefore the enhancement of cultural and social relationship among them.

The paper structures into five distinct conceptual parts: after a brief general introduction, authors define the main method and materials use for the research. Chapter 2 describes the Pavia case study with its settlement’s peculiarities; Chapter 3 analyzes and, then, cartographic analyzes with the support of regional and municipal databases. The main strategy and the specific actions for each intervention in the different city’s neighborhoods were then defined with the support of a Collaborative (and interactive) Planning tool used to implement the project (Chapter 5) of the new soft urban mobility network, explaining the strategic framework and the specific actions. Finally, last section is about discussion and definition of possible further theoretical and applied research’s development.

1.1. Materials and Method

The relationship between University City and the specific university settlement is complex primarily because, due to the variety of applications, it is impossible to classify all cases in on way. As theoretical reference framework, numerous settlements models categorize the two systems considering their mutual location (Coppola Pignatelli, 1969; De Lotto et al., 2014 and 2015; Venco, 2015). It is important underling that the most relevant aspects of these models are not only linked to the geographical location, but to the relationship among the different elements and therefore the role that the university system creates with the urban system. Moreover, also the so-called resources (distributive, spatial, qualitative and quantitative) are fundamental elements: facilities (sports activities, cultural activities, libraries, leisure activities, commercial activities, green areas and so on) and other physical spaces (buildings and areas for teaching and research, residential buildings for students, meeting spaces, parking lots, and so on).

Considering Pavia’s case study, following De Carlo’s ideas for city development (see Chapter 2), the University reaches a multipolar structure: in order to connect all the elements (physically and organizationally) it is fundamental the implementation of a very efficient and widespread infrastructural network especially for bikes and pedestrian. In particular, to understand dynamics, characteristics, strengths and criticalities of the urban territory, authors carry out classical urban and morphological analyzes and, then, cartographic analyzes with the support of regional and municipal databases. The main strategy and the specific actions for each intervention in the different city’s neighborhoods were then defined with the support of a Collaborative (and interactive) Planning tool, MyMaps application, based on Google Maps and Google Earth was used. The use of a Collaborative Planning tool allows to overcome the rigid top-down urban planning approach, favoring flexible strategies and actions to adapt to the changing conditions and needs of stakeholders and citizens, fundamental condition to reach the spatial, social, cultural and economic objectives successfully. Furthermore, the use of such a process and tool allows the municipality and the
stakeholders to choose the most suitable interventions to be implemented having clear, and always available, the global and strategic overview that underlies each specific choice.

2. University-city settlement: Pavia case study

In 1967, taking advantage of national law 641 “Standards for university school buildings; financial plan for the intervention in the five-year period ‘67-71’, the University of Pavia, which needed to find new locations for educational activities and related services, commissioned Giancarlo De Carlo to draw up the overall development and building renovation plan. De Carlo’s advanced vision (1972) clearly emerges from the 1970 to 1974 plan (but not completely adopted in the 1976 Astengo and Campos Venuti city plan). It aims to create a strong network of connections between university and city, between students and residents and of making a complete integration between the urban system and the university system using a multipolar scheme as placed structure. The physical location on the territory has generated and helped to maintain a solid and continuous relationship between the two institutions, as well as has implemented and improved urban quality by acting directly on the functional and social mix, generating the necessary driving forces for development (or revitalization) of local economy. On the other hand, the physical distance between the different poles and between them and the other attracting points of the city (hospital, historic city center, railway station, etc.) requires increasing attention in physical relation. Above all, the fundamental aspects of mobility (understood as an infrastructural system defined by physical elements and human being) to take into account are road security and safety, transportation means, accessibility, concurrent types of mobility on the existing road network, pollution, noise and quality of urban spaces (De Lotto, 2008). Strongly inspired by political and social values, the structural idea of De Carlo Plan envisaged complete integration between urban system and university system (plan’s motto was “the city campus is the city”; De Carlo, 1974). It is evident in the macro-localization characteristics; in the idea of territory-integrated management that overcame the barriers of Public/Private soil properties towards a vision of functional and social mix; in the intention of creating a strong connections network between university and city, and between students and residents. According to the architect, the university could no longer be a separate body from cities and territories, nor could be indifferently mixed in the urban fabric, as a mere services (Buncuga, 2000). The University must be an active part of society and the territory and it cannot be conceived as an autonomous body, but must be permeable, open, widespread, but at the same time concentrated in poles that become territorial connectors. With this type of organization, it possible to combine the characteristics of campus, as a model that offers autonomy and spatial concentration to the university system, and those typical of the scattered university model which aim to avoid the isolation of the university from the social context (De Lotto, 2008). In this particular configuration, the mobility network is fundamental to allow the optimal integration levels that can guarantee the different poles and different areas to interact.

As mentioned, De Carlo’s project was only partially realized: the university structured on two main poles was confirmed (the humanistic one in the city center and the scientific one in the Cravino area, north-west of Pavia). The first is a natural expression of University City system, perfectly integrated into the urban settlement system; the second has hybrid characteristics: partially campus and partially integrated within the city morphology (Fig. 1). In the Cravino area, there are also hospitals, scientific faculties, students’ services (a canteen, sports center with swimming pool) and some university colleges and student residences. From a morphological and location point of view, the Cravino area suffers from a certain isolation, while daily life (of students and teachers) revolves around the historic center.
3. Pavia current soft mobility system

Considering the whole dimension and the structural morphology of Pavia (urban area is almost 16 skm), travel time and distances are limited: by bicycle, it is possible crossing the city in about 15 minutes. Many citizens bikes systematically, especially in the city center and near large public functions (universities and health care facilities).

Pavia is an attractor pole for people, and therefore for vehicular traffic from extra-municipal territories. The territorial value of movements has a clear influence on the modal choices. In fact, as the picture of the pre-pandemic situation highlight, cars cover a much lower amount (54%) of internal travel than that of inbound and outbound journeys, with over 70%. On the other hand, collective transport shows greater attractiveness in inbound journeys (19%) than in the city area (11%) and outbound (8% of those directed to the provincial territory) (Pavia City Plan, 2013). Considering the different travel reasons for internal journey, private cars are used for 55-60% of trips; public transport is the most used transport mode for study purposes (school and university), with a percentage value of 28%; bicycle mobility shows substantially constant percentage values for the various travel reasons, between 15-20%.

Although it is clear that non-motorized vehicles are an important factor in city mobility, with bicycles used by almost 2/3 of citizens (Pavia City Plan, 2013), the urban cycle mobility network has some significant, and very common, criticalities that do not make the system functional, accessible and safe completely. In particular, the discontinuity of the network, the lack of radial trajectory from the peripheral neighborhoods to the city center and the main poles, the limited diffusion of cycle paths on the roads with the greatest vehicular traffic per hours and sometimes inadequate safety devices on the network (physical barriers, traffic lights for bikes, illuminated crossings and so on).

4. Strategic idea for Pavia soft mobility plan: the collaborative instrument

Given by Municipality and University the need to implement sustainable mobility in order to improve usability, accessibility and safety of the route between university poles and historic center, railway station, bus station, residential districts and other school centers, a Collaborative Planning process has been launched (Healey, 1998; Innes et al., 1999). The Collaborative Planning is an interactive process of consensus building and implementation involving University, Municipality, main stakeholder and private citizens (Tewder-Jones et al., 2002; Margerum, 2002; Brand et al., 2007). In this particular case, it is useful to develop a shared overall strategy of soft mobility on the entire city.
area and actions focusing on the peculiarities of each road sections considering urban morphology, urban open spaces quality, traffic flows, road safety, pedestrian and bike safety, noise and pollution reduction and so on.

In Pavia, the main objective is to connect places through a system of safe, qualitatively pleasant paths for cyclists and pedestrians by introducing bike lane, 30 km/h zone, raised pedestrian crossings, suggesting, where possible, determined interventions with only ordinary maintenance of the existing routes in order to reduced costs and time of execution. As shown in Fig.2, this device allows using, on the same platform, the 2D and 3D view functions and the Street view functionality. At the same time, it allows georeferencing the whole project, create new overlapped work layers, insert images, take measurements, and prepare maps with customized layouts.

![Fig. 2. Collaborative Planning tool: methodological steps of analysis and project actions development.](image)

Furthermore, the application allows sharing the project defining the degree of accessibility and modifiability of the project itself. This peculiarity permits the operator to share and receive, simultaneously, technical feed backs made directly on the project by competent experts or to disseminate it only for viewing to persons that, despite being interested, do not have the procedural skills to work on it autonomously. In this second case, an online form is also provided to be filled in for general observations or specific comments on precise areas.

In particular, on the MyMaps tool a layer on the current situation was created to identify urban roads and, consequently, road sections with the most significant criticalities. For each of them, the listed sections were defined (with the support of GIS tools and municipal and regional database), a photo gallery was inserted and an alert was added in order to define the priority ranking of the various interventions. Therefore, a new layer was created with the project proposals for each selected road section (for this project, over 40 different road sections are taken into account). In addition to the definition of the general variations on streets and intersections, for each road section, specific comments, technical drawings for each proposals (for almost all the sections, at least two scenarios are defined) and a hypothesis of costs and times of the works executions have been added. With all this information (in some case,
very technical but available on the project canvas intuitively), the tool will be presented to the municipality and stakeholders for comments, reviews and therefore for the final choice of interventions (and priority of interventions).

5. Strategic idea for Pavia soft mobility plan: the milestones of the project

After the analysis of current soft mobility system’s criticalities and the identification of main destinations (university and hospital poles, historic city center mainly) and origins (historic city center, rail and bus station, residential districts located to the north and east of the city) of flows, the project considers the total urbanized territory of Pavia creating a capillary soft mobility network. It provides the construction of new cycle path sections, the introduction of new road crossings for bicycles also with traffic lights and the secured of some pedestrian crossings. In some cases, the project defines the insertion of 30 km/h zones where: the section road did not allow the creation of cycle paths duly separated from the vehicular flow; or where the morphology and the quality of intersections and roads section requires a fully redevelopment in order to favor pedestrians and cyclists uses.

In all the considered areas, the directions of travel and urban and extra-urban bus stops have never been changed. Moreover, where possible, the presence and number of car parks are maintained. Only in one case, it is necessary to identify a new public parking area: only few steps from the station, in a dismissed industrial area, the project identify a portion to redevelop that can accommodate this function by allocating about 100 cars now left along the streets).

In addition, the tool identify also the types of intervention necessary for the project development. The entire operation falls on the municipality ordinary and extraordinary maintenance of infrastructural system, so in different chapters of the Municipality economical balance. So, in order to speed up the execution times and also to have a containment of costs, many of the actions were oriented to be ordinary maintenance, such as for viale Taramelli (the road linking Hospital pole and Cravino pole). Other project actions, on the other hand, require extraordinary maintenance: here, there is a complete renovation of road surface, inserting pavements and cycle paths, moving parking lots and creating new roundabouts (via Brichetti-via Aselli that connect rail station and Cravino pole directly).

In detail, Fig.3 shows the project conceived for the connections between the historic city center, the railway station area, the Cravino pole (university pole) and the hospital pole. In particular, the roads (with different dimensional and morphological characteristics) such as via Ferrata, via Taramelli, viale Triste, Piazzale della Stazione, via Monti, Corso Manzoni, via Aselli, via Flarer, via Bassi, via Brichetti, viale Golgi, via Folperti distribute almost the whole students, workers and users flows from university and hospital poles to the city center pole and vice versa.

As previously described, the current situation on these roads is quite uneven due to their morphological characteristics (size, proportions, presence of trees), main use (vehicular flows, people flows, urban functions) and degree of safety (sidewalks, cycle paths, safe crossings). Consequently, the proposed interventions are diversified.

The idea to separate flows of those who, starting from the rail station, have the university or hospital as their destination creates two distinct paths. The first, towards the hospital, is located on portion of existing cycle path (via Chiesa, Rondò dei Longobardi, viale Taramelli, viale Trieste) in streets equipped with pedestrian paths and with a wide section that allows, where necessary, to insert the missing portions. In these cases, it is ordinary maintenance work: insertion of bike lane in the carriageway, restoration of horizontal signs and improvement of road pavement.

The same procedure was followed for the road between the hospital and the Cravino poles: also, here there is already a cycle/pedestrian path. Along this road, an important intervention is the insertion of a cycle road crossing with traffic lights between via Taramelli and via Bassi to manage the huge flow of vehicles and bicycles at the entrance to university institutes and related services (canteen and university sports center).

On the other hand, the flow to the Cravino pole was directed to west beyond the railway: in this case, most of the interventions are extraordinary maintenance as there are currently no cycle paths. The need to use this road lies in the desire to connect also colleges and university residences with the rail station and with the Cravino pole as well as redeveloping unsafe roads for pedestrians and bicycles but highly used for route speed. Therefore, on via Brichetti, viale Golgi, via Flarer and via Aselli a bi-directional bike lane was inserted using the space currently occupied parking lots, redirected to a dismissed area nearby. Moreover, a 30 km/h zone is insert: the road section do not allow the creation of separate paths for pedestrians and bikes so, the road secured becomes a starting point to renewal the contiguous square with some commercial and restaurant activities. On the last portion, a new cycle path is obtained from the tree-lined sidewalk up to the already existing cycle-pedestrian path that reaches Cravino pole.
6. Discussion and Conclusions

Regarding Pavia context, as De Carlo (1968) said, the University must be related to the reticular motion of a continuous process of transformation in which it must assume a connective role of fundamental importance. The presence of an ancient University of international importance produces significant effects in the urban and territorial systems: with the University strongly involved in their development, territory and city growth becomes connected with the growth of the University itself. Moreover, the specific context of Pavia has various positive aspects: the small dimension of the city and that the whole city is a “15 minutes city”; the high ratio between students and inhabitants that makes Pavia a real University-City; the high quality and clear identity of the different parts of the city (above all: the historical city center and the recent scientific pole at north-west of the city); the relevance of the University in all the major urban development phases.

About the general relation between city and University, according to some authors (i.e. Benneworth et al., 2010), the implementation of shared urban projects brings the University closer to the city, fostering the involvement of the local community in the use of university open spaces because it is no more a separate entity but a living body strictly connected with urban spaces and dynamics. University becomes a strategic factor for the development, modernization and renovation of both urban fabric and territorial areas. Di Leo (2015) underlines how a renewed role of the University in close collaboration with local institutions (such as municipalities and associations) could be an ideal driving force for a renewal process of the entire city and of the relations among them. Since that university activities cannot exist if isolated, the territory must be enforced with a strong infrastructure system and strategy linked to the
University itself. Therefore, the level of integration of the environment, the quantity and quality of the physical and intangible interrelations that it can guarantee becomes fundamental. Among all the possible typologies of links, the one related to soft mobility assumes an interesting role because it permits to face different issues: 1) the physical network (connected with the spatial shape of the city); 2) the role of urban functions depending on their multimodal accessibility; 3) the diverse use of the same spaces among the various users (citizen, students, professors, researchers, doctors, etc.); 4) the improvement of the shareable events between city and University systems; 5) the favorable and healthy behaviors related to bicycle and pedestrian mobility.

Medium-distance cycle and cycle/pedestrian paths (between the poles, city districts and identified socio-economic-infrastructural-cultural emergencies) are essential elements for the development and the sustainable renewal of urban fabric with the necessity to trigger more and more participatory processes and share projects between the different city realities. University, as attraction pole for a very large number of users (with the related demand for services and the need for expansion), and as an economic driving force, is able to trigger continuous physical and social changes in urban spaces. The structural project presented here fits perfectly into this cultural context and aims to respond to road safety needs clearly expressed by citizens. The project responds with a single uniform and organic development of the university-city system to the needs expressed by the municipality and the university governance. The use of a Collaborative Planning tool helps in sharing the planning process and therefore helps all the involved stakeholders in accepting the technical and political choices. Many mobile apps are nowadays developing very fast (i.e. Moovit, https://moovit.com/it/features-it/) and the behavior and decisions of users are taken into account in the decision making algorithms. These apps have data of users’ movements and they optimize travel proposals according with users’ choices; they are an almost real bottom-up Decision Support System. Collaborative instruments, such as the one proposed in this paper, try to shorten the distance from the top-down side.

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