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New scenarios for safe mobility in urban areas

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Contents

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Active mobility in historical districts: towards an accessible and competitive city. The case study of Pizzofalcone in Naples.

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Abstract
Active mobility, in the form of walking and cycling, is one of the most affordable and practical ways to promote sustainable modes of transport in urban areas, creating walkable, safe, healthy and livable environments. Given its multiple beneficial effects, the scientific community frequently considers it as a driver of urban regeneration, highlighting its role in the enhancement of accessibility and competitiveness. This study aims to deepen the role of active mobility in the redevelopment of historical districts characterized by economic and social marginality, as well as consider the resulting improvement of connectivity, attractiveness, and quality of life. To this end, we identify and classify strategies and best practices of active mobility provided by recent papers and international reports. In addition, we propose the application to a significant case study, Pizzofalcone, in the City of Naples. The area, characterized by high historical, architectural, landscape and cultural value, is not integrated with the rest of the historic city center and currently suffers economic and social marginality. The project proposal, which suggests the redevelopment of the area by redesigning pedestrian and cyclist paths, could be an interesting and economical solution to make Pizzofalcone a fundamental hub for the city and a crossing point for a multitude of people.

Keywords
Active mobility; Urban redevelopment; Historical districts; Accessibility; Competitiveness.

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1. Introduction

Active mobility, intended as the promotion of walking and cycling, has been gradually recognized as one of the most affordable and practical ways to move around the city. In the 21st century, faster modes of transport are no longer considered as the best modes of transport, since new goals of accessibility, liveability, economic vitality, age-friendliness, sustainability and health are increasingly recognised as being more important (Tranter & Tolley, 2020). Getting more people walking and cycling, rather than use private forms of transport, is essential to create more sustainable, walkable, safe, healthy and livable environments (Koszowski et al., 2019; Hackl et al., 2019).

Given its numerous beneficial effects, active mobility is frequently considered by the scientific community as an efficient and economical driver of urban regeneration (Adkins et al., 2012; Baldissara & Fasano, 2016; Vich et al., 2019). Several studies demonstrate how active mobility measures improve health conditions – by reducing pollution and traffic congestion -, accessibility, citizens and city users' opportunities, and even safety perception and attractiveness of urban areas. Throughout the redevelopment of pedestrian and cyclist paths, it is possible to enhance the connectivity among houses, services, public facilities and green spaces, valuing built heritage and promoting wellbeing and social inclusion. In the most significant cases, active mobility is a marketing tool for cities, able to contribute to their urban identity, to encourage cultural and commercial activities, as well as to promote investment in the tourism and tertiary sector, increasing the competitiveness of urban areas (Papageorgiou, 2019).

In this scenario, active mobility measures are well suited to redevelop areas of historical, artistic and environmental value, considered their specific needs, features, along with the constraints and limits of transformation (Shin, 2010; Wang & Wong, 2020). Historical districts are characterized by the need to preserve and restore the built heritage and urban structure, and to enhance at the same time their cultural value. Although, starting from the second post-war period, historic city centers have suffered depopulation processes that have led to the progressive deterioration of the built environment and the proliferation of poverty and inequality (Couch et al., 2008; Blanco et al., 2011; Porter & Shaw, 2013). Social exclusion and criminality are some of the problems that emerged, together with the soaring complexity and contradictions (Madanipour, 2011). This progressive abandonment has accompanied the already existing lack of amenities, green areas, public facilities within walking distance (Granata et al., 2010). Urban regeneration has gradually become the key to the problem (Coco, 2007; Roberts et al., 2016), since it is characterized by a combination of integrated actions and objectives which seek to solve urban problems in an area with characteristics and opportunities of improvement, by intervening in multiple dimensions, such as settlement, economy, environment, society and culture (Roberts & Sykes, 1999; Mecca & Lami, 2020). Among these dimensions, the promotion of walkability, is consolidating its position for urban regeneration, as an engine for the quality and attractiveness of urban areas (Adkins et al., 2012; Baldissara & Fasano, 2016). The redevelopment of urban paths encourages sustainable mobility, improves the connectivity among dwellings and services, adds value to existent built heritage, and promotes health and wellbeing. Therefore, the encouragement of active mobility can be considered as a means of the redevelopment of historic districts, in order to not only enhance the level of accessibility, but also create a competitive advantage.

This paper deepens the role of active mobility in the redevelopment of historical districts characterized by economic and social marginality, as well as consider the resulting improvement of accessibility and competitiveness of urban areas. To this end, we identify and classify strategies and best practices of active mobility provided by recent papers and international reports. This phase of the study is essential to understand how enterprises and public administrations are undertaking to implement specific investment projects aimed at improving active mobility in cities and towns. Furthermore, the study of best practices is propaedeutic to the development of the final product of this work: the application to a significant case study, Pizzofalcone, in the City of Naples. The area, despite its high historical, architectural, landscape and cultural value, is not

integrated with the rest of the historic city center and currently suffers economic and social marginality. The project proposal, which suggests the redevelopment of the area by redesigning pedestrian and cyclist paths, could be the starting point for a complete regeneration process of the area in order to make Pizzofalcone a fundamental hub for the competitiveness of the City of Naples.

The next section examines the relationship between the improvement of walkability/cyclability and the increase in accessibility and competitiveness of urban areas, with a focus on the situation of historic districts affected by socio-economic problems. Hence, section 3 provides an overview of the strategies and best practices provided by recent plans, projects, and initiatives which are the basis for the development of the next phases of the work. The fourth section explains how this preliminary study has converged in a matrix of integrated actions, fundamental to develop the operational procedure and, then, the application stage. Finally, in section 4 deepens there is presented the application stage, in particular, the project proposal for the area of Pizzofalcone elaborated by following the mentioned procedure. Paragraph 5 contains the results conclusion of the work.

2. Active mobility for accessibility and competitiveness in historical centres

Urban growth and transport are strongly related issues. The rapid urbanization that we have been experiencing since the second half of the 20th century has determined higher demand for transport infrastructure in urban areas and the necessity for people to reach multiple destinations according to their daily needs (Banister, 2008). By 2050, it is expected that 68% of the global population will live in cities, hence transport systems will play a vital role in the development of urban areas (UN, 2019). They determine potential mobility options for people and goods and influences accessibility to economic activities (Meyer & Miller, 1984). Transport impacts nearly every aspect of our lives and has an especially profound influence on the global performance of cities and on the quality of life of inhabitants (Aljoufie et al., 2011).

In this scenario, active mobility, intended as walking, cycling and riding public transport to get around the city, is considered an effective and sustainable solution to the negative effects generated by the growing demand for travel, unlike other policies and measures perceived as more invasive (Köhler et al., 2009; Markvica et al., 2020) and its potential is increasingly recognized (Ferretto et al., 2021). Nearly half of all car trips cover less than five kilometres, and the effects are extremely damaging, therefore active transport modes have huge potential for growth, particularly in urban environments (Litman, 2012). As the cleanest and most efficient mode of transport, active mobility provides multiple benefits since it can boost access to services and activities, reduce pollution and traffic congestion, improve the places' attractiveness, foster wellbeing and social inclusion. Although ideally suited for shorter distances, walking and cycling are no longer considered merely a functional means to get from one point to another. Instead, they involve different purpose and multi-sensory experience (Singapore - URA, 2018). Moreover, measures of active mobility have been proposed as effective for helping urban centers in achieving global and local sustainability goals (Ferretto et al., 2021).

Active modes of transport as walking and cycling help to reduce the negative effects of motorisation by reducing pollution and traffic congestion; they encourage people to undertake physical activity, thus improving cardiovascular health, longevity, cognitive function and overall level of well-being; finally, they provide social advantages, by boosting accessibility, creating proximity opportunities for citizens (Koszowski et al., 2019; Green City Network, 2020), and enhancing safety perception of urban public spaces (Gargiulo, 2014).

By creating cycling and pedestrian infrastructure that make active mobility safer and more attractive, cities become more accessible, healthier, and liveable places for all, hence they are able to enhance their competitiveness (Güzey, 2009; Adkins et al., 2012; Baldissara & Fasano, 2016; ITDP, 2018). Promoting active modes of transport enhance urban accessibility by creating proximity opportunities for citizens and increasing connectivity between dwellings, services, facilities and retail structures. It has beneficial effects on health conditions – by reducing pollution and traffic congestion -, accessibility, citizens and city users' opportunities,

and even safety perception and attractiveness of urban areas. Moreover, making pedestrian/cyclist paths pleasant and comfortable not only makes cities more accessible but also more attractive.

For instance, a consistent and pleasant design would encourage active mobility as a popular commuting means, as well as an attractive recreational option. (Singapore - URA, 2018)

Considered all its beneficial effects, active mobility is frequently considered by the scientific community as an efficient and affordable means to regenerate different urban contexts. Several studies and numerous best practices demonstrate how active mobility measures improve the quality and attractiveness of portions of territories, enhancing their accessibility and competitive value. In particular, it can take on a key role in the regeneration of historical districts, characterized by the need to promote cultural heritage and give value to stratified settlements (Shafray & Kim, 2017; Damilano et al., 2020). The positive effects, in fact, are even wider in historical city centres, where cultural heritage, in addition to the people wellbeing, can take advantage from the reduction of congestion, pollution, health problems and social inequalities (Alves et al., 2021). This is true especially in those areas characterized by marginality and socio-economic problems, where active mobility can address urban development towards higher levels of accessibility and competitiveness (Southworth, 2005; Bahrainy & Khosravi, 2013). Many historic city centres, indeed, has suffered depopulation processes, after the second post-war period, that led to progressive deterioration of the built environment and the proliferation of poverty and inequality. The critical state of conservation and the consequent decrease in competitiveness of many historic centres is rooted in:

- depopulation and repopulation with lower-income citizens;
- the shift of the main economic activities in the suburbs;
- the inadequacy of urban services and the lack of facilities;
- the increase of the motorized demand of transportation to reach services and activities;
- the lower level of accessibility;
- degradation of the built heritage and abandonment of the cultural heritage.

Active mobility becomes an instrument to redevelop degraded areas since it can provide environmental, health and social benefits. Active mobility can be one of the most efficient and economical solutions of regeneration for historic centres. In particular, promoting walking and cycling can:

- decrease the damaging effects of motorization by reducing pollution and traffic congestion;
- encourage people to undertake physical activity, thus improving the overall level of wellbeing;
- enhance the safety of urban public spaces;
- provide social and economic advantages;
- strengthen the connectivity among houses, services and public facilities;
- value the built and cultural heritage.

In historical centres the role of active mobility in urban regeneration hinges not only on the number or duration of walking/cycling trips, but also and above all on the quality of those trips in term of user experiences (Adkins et al., 2012). Several studies agree that the characteristics of the built environment and of public spaces widely sway the travel behaviour of pedestrians and cyclists, according to the linkages to other modes of transport, path's safety and quality, landscaping etc. (Southworth, 2005). Each urban characteristic provokes users' reactions that contribute to their perception of walkability and to their future behaviours (Crankshaw, 2012). So, making pedestrian/cyclist paths pleasant and comfortable becomes a means of urban redevelopment and an essential resource in areas of historical interest to attract continuously people and visitors. Additionally, the availability of green, parks and gardens in urban areas encourages people to practice physical activity, since they provide a safe, accessible and attractive setting for walking and physical activity practices (Almanza et al., 2012).

This has a double benefit: on the one hand it enhances urban competitiveness and touristic attractiveness (La Rocca, 2015), thanks to the valorisation and branding of cultural heritage; on the other hand, the continuous presence of passer-by may reduce criminality and social exclusion while improving perception of safety, quality of places and, consequently, quality of life. A livable and, thereby, competitive city is a city with convenient public transport, walking and cycling infrastructure to employment, education, public open space, local shops, health and community services, and leisure and cultural opportunities (McGreevy et al., 2019).

In historic centres active mobility measures could be an efficient and economical way to create a competitive spill-over in the territory. The improvement of walkability may well influence behaviors and attitudes, attract investments and improve the level of well-being of a territory (Gospodini, 2002; Kresl & Ietri, 2017). Walking, cycling and riding public transport in inner cities are seen by a growing body of literature as a means of improving not only liveability but also the global image of cities. In the most significant cases, it can work as a marketing tool for cities, able to build their urban identity, encourage cultural and commercial activities, in brief increase the competitiveness of urban areas. A move toward more walkable infrastructure would make residents better off and improve a city's competitive standing and desirability.

Next section consists of the recognition and comparison of the most significant measures intended to improve walkability leading to substantial results in terms of urban regeneration and, thereby, competitiveness of historical districts.

3. Classification of the best practices

This work aims at recollecting the most significant best practices of active mobility in historic centre and inner cities and organize them in the perspective of urban competitiveness.

All around the world, hundreds of initiatives have sprouted to put walking, cycling and other urban transport innovations at the heart of recovery efforts. They demonstrate the global shift towards supporting more high-quality walking and cycling infrastructure and highlighting active mobility's role in ensuring that cities are welcoming and attractive to people from all walks of life (WEF, 2020).

To bring order to the great number of best practice available in the scientific literature, the first phase of the study consisted of the construction of a matrix, which recollect the most significant walkability measures addressed to urban regeneration of historic centres, with significant effects on the competitiveness of urban areas. The matrix was developed through the selection and the comparison of the latest strategies and best practices, provided by recent papers and international reports.

Those have been selected and organized considering urban planning restraints generally in force in historical districts in addition to their physical, economic, social, and functional features. In particular, the work paid more attention to those measures and initiatives aimed at resolving problems of marginality, poverty and abandonment affecting historic districts and enhancing, at the same time, their cultural value. The next phase of the work was to identify which sectors are positively influenced by the promotion of active mobility from the point of view of urban competitiveness. The aim was to identify those measure with greater impacts on competitiveness of urban areas, in terms of attractiveness, livability and valorization of the cultural heritage in addition to the economic value of a territory. Different types of actions have been included. Public administrations, indeed, generally propose both direct (e.g. investments in bicycling and walking infrastructure) and indirect (e.g. promotion of commercial activities, improvement of green areas) intervention. The important thing is that all of these actions are addressed to spur people to practice physical activities, by walking and cycling around their neighborhoods.

The best-practices have been organized in a matrix whose structure takes over that of the national strategic plans and guidelines.

First of all, it is structured in macro-categories, categories and measures. The macro-categories refer to the different strategies and they are:

- information: they include informative solutions aimed at improving the information system of citizens, city users and visitors;
- organisational and Participatory Processes: they consist of action addressed to involve citizens in the transformation of an area, through their active participation;
- governance: they involve management, legal and political approaches;
- solutions based on ecosystem services: they include actions addressed to the improvement of greenness, environmental sustainability and the enhancement of air quality in urban areas through green measures.
- actions to improve and adapt services and infrastructure: they include technical and engineering solutions which includes hard interventions on the physical system of urban areas.

The subdivision in categories is a further streamlining of each of the macro-categories listed above. For instance, the macro category "Governance" is divided in the categories: Legislative and regulatory adjustments; Economic and financial instruments; Plans and strategies; Organization and management. Then there is the characterization of the specific measure (e.g. for the category "Economic and financial instruments" there are investment plans, economic incentives, taxes…).

Moreover, the objectives and a brief description of each action have been reported. The item "Type of measure" refers to the breakdown of interventions into green, grey and soft actions. Soft actions do not require direct structural and material intervention, since they include consultation and the participation of the public administration, population and stakeholders. The Green and Grey actions both have a materiality component. GREEN actions are aimed at protecting and safeguarding the environment, do not require significant economic resources and they include the provision of green areas, permeable pavement surfaces, sustainable management of natural services. Grey actions refer more to the built patrimony, and regard systems, infrastructures, structures, roads.

The probable impacts and an estimation of the costs are also included in the matrix, estimating approximately the costs for the implementation of the interventions. GREY measures turn out to be the most expensive, therefore decision makers should prefer those actions that, though more economical, enable the achievement of the same objectives and an equal increase in competitiveness. The column also shows the expenditure limits for the use of incentives.

The column "Horizontal benefits" is particularly important since it recollects other sectors that can benefit from the promotion of active mobility measures. Each sector is not isolated in a watertight compartment, but it is instead inseparable from the general framework. In this sense, the matrix must be read in a systemic key, considering all the potential relationships between one sector and another. The horizontal benefits are not confined to the direct consequences of the promotion of active mobility, but extend to many other fields: health, urban safety, climate resilience, energy, economy, tourism and so on. This aspect depends on the systemic approach typical of urban studies (Gargiulo & Papa, 1993) and of competitiveness, which is a multidimensional concept. By promoting walking and cycling, single actions provide a significant increase in the competitive level in multiple sectors, boosting the overall level of attractiveness of the area.

In the last two columns of the matrix, there is the reference paper or international report to which each action refers and the examples of cities or historical centers where the implementation of that specific intervention has brought to higher levels of competitiveness. In many cities some of the interventions have been so idiomatic that they still represent a landmark, a distinctive sign that makes the city recognizable and known throughout the world, increasing the magnetism for tourist and people.

The matrix is a tool that, on the basis of scientific studies, best practices and international reports allows for the identification of categories of action and actions that, with a view of promoting active mobility, are likely to lead to a significant increase in competitiveness.

Table 1 reports synthetically the structure of the matrix we built to classify the best practices.

Items	Description
ID	It is an Identification Code to easily select actions
Macro-categories	It refers to the general strategy to which the action is assigned
Categories	It is a more specific articulation of the macro-categories item
Measures	It refers to the action/intervention/initiative of the considered best-practice
Description	It describes the measures in a more in-depth way
Objectives	It describes the main aim of the measure
Type of measure	Green, Grey or Soft
Impacts	It deepens the potential negative effects of the interventions
Costs	It estimates the economic cost associated to the interventions
Horizontal benefits	It highlights the sectors that benefit from the implementation of the measure
Reference	It reports the study/report from which the measure/best practice comes from

Tab.1 The structure of the matrix built to recollect and organize the best practices

In the second phase, the operational procedure has been defined in order to proceed with the application stage. It is not possible to propose rigid applicable solutions without considering the urban context - territorial, socio-cultural and political (Baldissara & Fasano, 2016). The promotion of active mobility, if guided by culture and in-depth knowledge of the territory, can significantly affect competitiveness, encouraging investment, tourism and fostering culture-led development.

The first step of the operational procedure is the delimitation of the area, not necessarily coinciding with the administrative boundary, within the historic center characterized by marginality, socio-economic problems, lack of integration, routes inadequacy. Hence, a preliminary investigation of the conditions of the urban context is necessary. This is followed by the construction of the knowledge framework, the definition of the levels of transformability of the intervention areas, the recognition of the experiences already carried out, considered as the starting point for the new project.

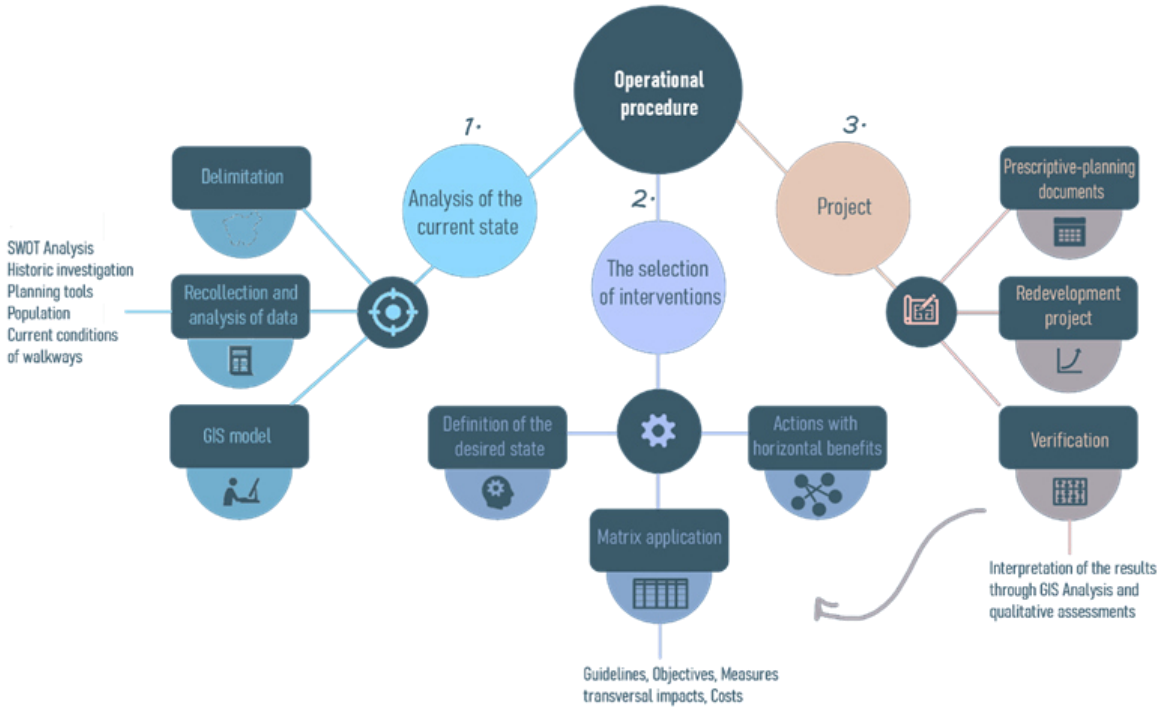

Fig.1 The operational procedure developed by the authors to develop the application to the case study

The collection and interpretation of data must follow the principles of the SWOT (Strength, Weakness, Opportunities, Threats) analysis. The SWOT Analysis highlights the relationship between different components such as: the opportunity-strength relationship, to mitigate negative components and exploit the strengths and enhance opportunities, starting from the vocation of the place to develop strategies of competitive development; the relationship opportunity-weakness, that is explicit with the elimination of the criticalities and the consequent valorization of the opportunities; and finally the relationship threats-strength, with the consolidation of the strengths, and neutralization of threats inside and outside the system (Halla, 2007). In the SWOT analysis different data and information should be taken into account. Demographic data and structure of the population can give an overview of the needs and the preferences of the population living in the project area. The recognition of existent initiatives is also necessary since it represents the starting point for the new project. A historic investigation is essential since it highlights the historical, urban and architectural evolution, as well as imposes restrictions given by the presence of listed buildings and spaces. The knowledge of planning instruments and building regulation in force allows for an understanding of which actions can be carried out, bearing in mind the constraints, limitations, and conditions imposed on the territory. Finally, there is the assessment of the state of conservation and the quality of paths and routes to identify the main critical points and the characteristics that might contribute most to the enhancement of historical centers. The collected data will be processed using GIS software which enable to build a virtual model of the area, easily updatable by the association of alphanumeric data with territorial features. Given the complete analysis of the case study, the next phase consists of the selection of the most suitable measures and initiatives. The selection will be based on strengths, weaknesses, opportunities and threats detected during the knowledge stage. It is necessary to pay attention to those measures that, along with the costs' minimization, provide wider horizontal benefits. Indeed, the effects of a local action are not close in themselves, but there exists the possibility to optimize the results of a single action, providing widespread positive impacts. This perspective goes hand in hand with the systemic approach that characterizes urban studies and in particular urban redevelopment. Besides, this phase must take into account the interventions' reversibility, the innovation, the valorization of the area, given its historical, cultural and economic value.

The next paragraph deepen some of the most significant best practices we selected during the construction of the scientific framework of the work. This phase is useful to develop the application to the case study because allow for understanding which measure of active mobility can be proposed to promot the redevelopment and, thus, the competitiveness of Pizzofalcone in the City of Naples.

4. Discussion of the most significant best practices

4.1 Temporary and permanent bike lanes and pedestrian paths

In the scenario defined by the spread of COVID-19, cycling and walking are useful for both social distancing and meeting the minimum requirement for daily physical activity, as stated by the WHO guidance. Cities around the world have been giving over road space to cyclists and pedestrians during the pandemic, providing people with walkable space (De Vos, 2020; Dunning & Nurse, 2020; Laverty et al., 2020).

First of all, in 2020 in Bogotá 84 km of temporary new bike lanes and sidewalks were added to the city's existing 550 km Ciclovía network, promoting the use of an alternative and sustainable mode of transport, such as cycling (Bogota Ciclovias Temporales, 2020). The launch of the initiative depended on the outcome of the novel Coronavirus, since the enlargement of the cyclable network was thought to prevent the spread of COVID-19, by reducing crowding and otherwise unavoidable contacts on the city's public transport network. The decision of temporary closure of part of the streets and then to make the bike lanes permanent 7 days a week arrived as a preventive action to the spread of the contagion (WHO, 2020). What drove the mayor to realize these temporary cycle paths was also the bad level of pollution reached in the city. The new lanes make

Bogotá's Ciclovía network among the largest of its kind in the world, furthermore reducing congestion and improving traffic safety. Not only did the initiative respond to the mobility challenge associated with COVID-19, but it provided also social and health benefits. According to a virtual survey held by the World Health Organization, citizens' interest in cycling is growing, with an increase of the number of people who would use cycling as a means of transport around the city from 8% to 16%. The bike lanes of Bogotá are characterized by flexibility and have the potentiality to enhance the function of city streets as public spaces. Moreover they foster health and social wellbeing by encouraging physical activity and active travel, also providing alternatives for commuting in the city, with the potential added benefit of decreasing air pollution levels. Since 2000, thanks to several interventions like this, Bogotá has been completely redeveloped and restored: if in the 80s and 90s it was known all over the world for organized crime and drug dealing, today thanks to innovative public policies has become one of the most interesting destinations in South America, with a great increase in its competitiveness and attractiveness. The accomplishment of important infrastructures like Ciclovías temporales have helped citizens to get out of poverty: thanks to these services today it is easier to move for work, since no longer is not owning a car as discriminating as it used to be. The urban transformations of Bogotá have given a strong boost to social aspects of the city, so today the capital is considered worldwide a best practice in terms of mobility and innovative transport but also in social and economic policies.

Similarly, Budapest created a network of 26 km of new cycle lanes after the city went into lockdown in March 2020, in addition to the pre-existing 256 km of cycle routes by reducing the number of lanes on some major roads. Moreover, the city significantly reduced the price for using the bike-sharing system (BUBI), bringing an increase of shared bikes of 20%, by more than doubling its share in the modal share (Bucsky, 2020; Eltis, 2021). Communication campaigns – on both social media and the city transport operator app – is heavily promoting active mobility. Other measures dealing with active mobility in Budapest include the construction of a fourth metro line, the extension of tram lines network and of metro line 1. These integrated actions offer the opportunity to deepen co-operation between bike users and public transport, creating integrated modes of travel. The Budapest Transport Center (Budapesti Közlekedési Központ, BKK), established in 2010 by the Municipality, plans to further embrace the approaches of mobility management and sustainable urban mobility planning (BKK, 2021). Building more cycle lanes, indeed, benefits not only the cyclists using them but drivers, too, by taking cars off the roads, and it is also helping to ease two of Budapest's big problems – congestion and air pollution.

Paris is another city which made available emergency bike lanes during the lockdown, to reduce the incidence of public transport on the spread of the virus. Just before the advent of the pandemic, Paris developed "Plan Vélo", a plan that provide that every street in the city would become cycle-friendly by 2024 (Plan Vèlo de Paris, 2021). The Île-de-France region pledged financial support for the preexisting RER Vélo project, a network of nine protected cycleways linking the center of Paris with suburbs, a network that mirror the routes of the RER metro rail lines into the city. Existing RER Vélo cycleways include an "express" version on Rue de Rivoli, REVe, for use of e-bikes.

In conclusion, also Milan approved a mobility plan, called "Strade Aperte", "open streets", to reduce car usage after the Coronavirus crisis (Berlingieri & Triggianese, 2020; Comune di Milano, 2020). The plan provides a series of strategies and actions of adaptation aiming at reallocating 35km of street space from motorist to pedestrian and cyclists. The plan encourages the use of active mobility for everyday journeys through the development of a dedicated network for cycling and walking, at the same time facilitating compliance with the safety measures of social distancing. The health crisis is considered as an opportunity to rethink and reorganize the streets as public spaces on a human scale and at the center of neighborhood life. This strategy goes hand in hand with a previous initiative, Milan's "Piazze Aperte" project, sponsored by the Municipality of Milan in collaboration with Bloomberg Associates, National Association of City Transportation Official (NACTO) and Global Designing Cities Initiatives, since 2018. The project has promoted the dissemination of pedestrian areas

across the city, designed to create safe and pleasant pedestrian or cyclist paths open up public space, protected by bollards or parking spaces. An important aspect of "Open squares" project regards the participation of citizens, involved in the submission of 65 new proposals which are currently being co-designed.
The temporary nature of the projects, initiatives and strategies described above has a goal which is not limited to the health emergency we are experiencing. It furthermore allows for a rapid and reversible solution testing, before investing time and resources in a definitive structural arrangement of the city bike lanes and pedestrian network, with immediate benefits and addressing the decision-making process towards a permanent solution.

4.2 Street art

Another means to encourage active mobility, increasing at the same time the attractiveness of the involved areas, is the promotion of street art and temporary installations within areas characterized by degradation and urban decay (Sharp et al., 2005; Borucka & Mattogno, 2016). Street art is a low cost tool for urban redevelopment since it can successfully assist urban regeneration of cities, places and communities, altering the negative perception of some spaces and addressing passers-by towards hotspots. These punctual measures can transform and reinvent the urban spaces and communities promoting creativity and productivity, improving quality of life, community participation and pedestrian networks. It can also enhance touristic attractiveness, providing economic advantages and creating a cultural and lively community/city.
There are many best practices in this field. Among them, the project "T.R.U.St. - Taranto Regeneration Urban Street", financed by the Puglia Region, has made Taranto the European capital of street art, through 16 works by national and international artists (Occhinegro & Manzulli, 2020; Corriere di Taranto, 2021). The project probed the regenerating force of street art in the most fragile urban environments, constituting the base for the future plans developed by the public administration to intervene on urban infrastructure.
In London, as demonstrated by a recent study by Seresinhe et al. (2016) the districts which presented the highest percentage of urban art have registered an increase in the real estate prices. Street Art is, in this context, an indicator of district quality improvement and real estate demand increase, as well as an attractor for resources and economic activities, since it boosts touristic attractiveness.
The dissemination of murals by Jorit in San Giovanni a Teduccio, a coastal suburb in the east of Naples, provided new prestige to the popular district, characterized by many social and economic problems. The interventions, if accompanied by more structural once, like the location of engineering university centres in this case, can significantly increase the competitiveness of the area, attracting people, visitors and tourists walking around the neighborhood and giving, at the same time, important messages to the community (Forte & De Paola, 2019).
Similarly, street art is a key tool for competitiveness also in Brussels, transforming it into an open-air museum. Whether commissioned or spontaneous, the artworks cover walls, urban furniture and, sometimes, entire facades, using the city itself as an exhibition space.
The plan Orme Ortica Memory of Milan constitutes another example of street art utilized as an instrument for the regeneration and competitiveness of an urban area, which implicitly sees active mobility as a protagonist. Ortica district has become a cultural district where people can walk and meet history at the same time, by observing twenty art works, among the largest in Italy, by the artists collective OrticaNoodles.
Finally, the Hundertwasser House in Vienna, designed by Friedensreich Hundertwasser, is one of Austria's architectural highlights, drawing visitors from around the world (Hospers, 2010). The project encourages the participation of citizens since anyone who lives in the Hundertwasser House has the right to decorate the facade around the windows of its apartment. The Hundertwasserhaus attracts the attention of walkers and cyclists, since it can also be viewed from the bike lane of the Ring . The Hundertwasser Village, created in 1990-1991, is open to visitors and includes a shopping center with a square, a bar and numerous stores in the typical Hundertwasser style.

4.3 Redevelopment of historical courtyards

Handing over the private inner courtyards to be transformed into public/private spaces is another solution proposed by different administrations. The result is transforming a city block from the outside in, altering the pedestrian experience and introducing new zoning changes that would give landowners air rights or tax credits in exchange for making their courtyards accessible to the public (Shi, 2016; Lalmi, 2020).

Among the best practices examined there is Hackesche Höfe in Berlin, a complex of eight interconnecting courtyards, full of attractions and entertainment venues, within walking distance from the Hackescher Markt underground station. The market area and adjacent vacant land was used as a parking area for many years until the mid-1990s when it was redeveloped to build twelve new buildings with central courtyards. A historical building with eight inter connected courtyards. The neighborhood is very popular among Berliners and visitors and since the 90s attracts tourists and people (Tarmoun & Baruffi, 2019).

In Marseille, in 2009, the City Council and the Marseille Provence Métropole began the promotion of the renovation of the port (Martone et al., 2014; Marotta, 2014). The Euroméditerranée project is a program to regenerate creating homes, offices and cultural centres in an area of over 480 hectares, the biggest regeneration area in Southern Europe. During the 20th century, the port fell into neglect and around 80% was occupied by unauthorized constructions. Among the interventions proposed by the program, Les Docks is a huge old factory across the main street rue de la République that has been transformed into a retail and commercial centre. The old fabrique has become a chained path, among several courtyards equipped with restaurants, bar and shops. Moreover, now rue de la République has 60% of its surface for pedestrians, provided with shadow areas, the urban space has been cleared from obstacles and vehicular transport and priority has been given to walkability and pedestrian connectivity. The area has been turned from a very poor neighbourhood into prime central real estate, considerably enhancing its prestige and attracting international investment.

"Festival de los Patios" is another similar initiative in Cordoba. It is a two-week spring event, during which the inhabitants of Córdoba open their homes to visitors so that both their fellow citizens and tourists can admire the inner courtyards, transformed into exhibition spaces set up with flowers, plants, trees and herbs. This popular competition aims to promote the commitment of the citizens of Cordoba in the protection of the historical courtyards. For this reason, every year, the City of Córdoba, together with various private companies, awards prizes to the most beautiful courtyards. Another reason to encourage this initiative is that it helps to spread knowledge of traditional Cordovan architecture, showing a cultural heritage that normally remains hidden from the public's eyes (Rodríguez-López, 2017).

Finally, there is the Álvaro Siza's restoration project for the pedestrian routes connecting the courtyards of Chiado, in Lisbon. The reconstruction of the Chiado area was necessary due to a fire in 1988. What interests most this study is the transformation of the courtyards into public spaces, the creation of paths, the design of the interiors of the buildings, which is actually a reconstruction operation. The route provides access to Carmo Street and Garrett Street from Largo do Carmo using ramps, stairs, and also by a public elevator incorporated in the recovery of Edifício Leonel, a building that already offers access from and to the Santa Justa Elevator through a footbridge (Public space, 2016).

4.4 Green infrastructure

The construction of a green infrastructure, especially within inner cities and historic centres, often characterized by the lack of green urban areas, has the benefit of enhancing sustainable mobility (Gargiulo et al., 2017). Moreover, green routes and corridors can reduce air and noise pollution, improve urban ventilation (thereby reducing the heat island effect), provide ecosystem services and habitat to plant and animal species and improve resilience to floods and other negative effects of climate change. The existence of a green

infrastructure can improve the physical and mental health of urban residents, promoting better levels of quality of life (Semeraro et al., 2017; Bianconi et al., 2018).

Several urban initiatives have been promoted or proposed in this field. These pioneering cities are implementing "nature-based solutions" such as green corridors, linear parks, pocket parks and shared walkways to enhance all these aspects which are strongly connected with the concept of competitiveness of urban areas. By maximizing the available public space people can move around the city more actively, enjoy their free time and interact with others.

Tallinn is one of the city which have made greenery one of its key strategies for the future development of the city as exposed in the Development Plan 2021+, which foresees the reduction of greenhouse gas emissions and the expansion of green areas (GoGreenRoutes, 2021b; Development Plan 2021 +, 2021). Park Vormsi is situated in the eastern part of Lasnamäe, in Tallin, within walking distance from the homes of thousands of locals. Vormsi park is the ideal public space for co-designing a new urban garden with local citizens that will result in increased social interactions and reduced stress levels, thanks to the opportunity to rely on active modes of transport within green areas. Tallinn's nature-based solutions will prevent the deterioration of air quality in the downtown area and counterbalance the adverse health effects of air pollution such as asthma and the spread of infections. Sports and educational events will provide a platform for environmental learning and to inspire the emergence of new green solutions and innovations in the future.

An extensive urban regeneration project, in which green is a key aspect, is slated to take place in the town of Stockton in the UK, drawn up by Ryder Architecture and backed by the Stockton Borough Council (BBC, 2020; Lichfields, 2021). The scheme proposes the demolition of the existing Castlegate Shopping Centre and the substitution with a riverside park, linking the High Street with the River Tees - as well as a campus of new mixed use buildings – in the framework of a 37-million-pound project. The proposal will consolidate the town centre's retail offer and reduce the overall vacancy rate, by encouraging the relocation of the remaining retailers within the Castlegate Centre to the other main shopping centre in the town centre.

Versaille, in France, benefits from a green living environment, with a vast network of parks and green spaces, and sustainability policies that promote a harmonious marriage between architecture, cultural heritage and natural features (GoGreenRoutes, 2021a). In terms of mobility, the implementation of a system that favours cycling over motorized travels is in progress, resulted in the construction of 22 km of cycling lanes, crossing the city and the de la Reine park. Versaille's nature-based solutions will revitalize neighborhood life by creating a new range of outdoor activities, promoting sustainable modes of transport and allowing or the use of sport and leisure facilities, within walkable distance.

4.5 Plans for sustainable mobility

The Sustainable Urban Mobility Plan of Rome (PUMS) is a strategic plan that addresses mobility in a sustainable sense with short, medium and long term interventions (Roma Capitale, 2019). The PUMS deal with a broad range of mobility issues, including those relating to active mobility (walking, cycling, riding public transport), along with infrastructure for public transport and the primary road network. The aim of the plan is to promote accessibility and safe modes of transport for all, also through the use of new technologies that can facilitate communication and connections between infrastructure, vehicles and people. It has been developed by following the guidelines for the Urban Plans of Sustainable Mobility approved by the the Ministry of Infrastructures and the Transports in 2017. On the basis of a Preliminary Report on the possible significant environmental impacts resulting from the implementation of the plan, Roma Capitale and the Lazio Region have opened a consultation with environmental stakeholders and the PUMS has also been the subject of a participatory process. The objective of the plan is to guarantee all residents transport options that enable them to access key destinations and services, creating safe and less polluted paths to encourage people to choose

active modes of transport and to make Rome a "slow" but efficient city. The interventions proposed by the plan are thought also to contribute to the attractiveness of the city, especially in the city centre.
Glasgow City Council recently published part of its new strategy to promote active travel across the city (ECF, 2021). The strategy is part of the recent Liveable Neighbourhood's Plan, which aims to reduce dependency on private cars and includes an extensive new network of 270 km high-quality cycleways and upgraded footways. Furthermore, the implementation of the plan will ensure that no home will be further than 800m from a segregated cycle lane, so that people will reach their destinations in under 30 minutes or at least an hour. The proposal, firstly, depends on the need to reduce motorized traffic congestion in a growing city. Secondly, it is oriented to improve safety, the lack of which currently discourages people from using active travel and in particular, cycling. Therefore, the new plans will meet the existing demand for cycling whilst also promoting soft measures such as the Bikeability Scotland cycle training within schools that allow children to cycle safely and confidently within the city. The proposed plans also takes into account climate and sustainability issues.

5. Application to the case study of Pizzofalcone in Naples

The present work proposes the application to a case study, Pizzofalcone, an area within the City of Naples, located in the inner city. We considered the area significant to this study because of its characteristics, and, in particular, the conditions of the walkable pathways. Although the area falls within the historic center and despite being characterized by a settlement of high historical, architectural, landscape and cultural value, Pizzofalcone is not integrated with the rest of the historic city center and suffers economic and social marginality.

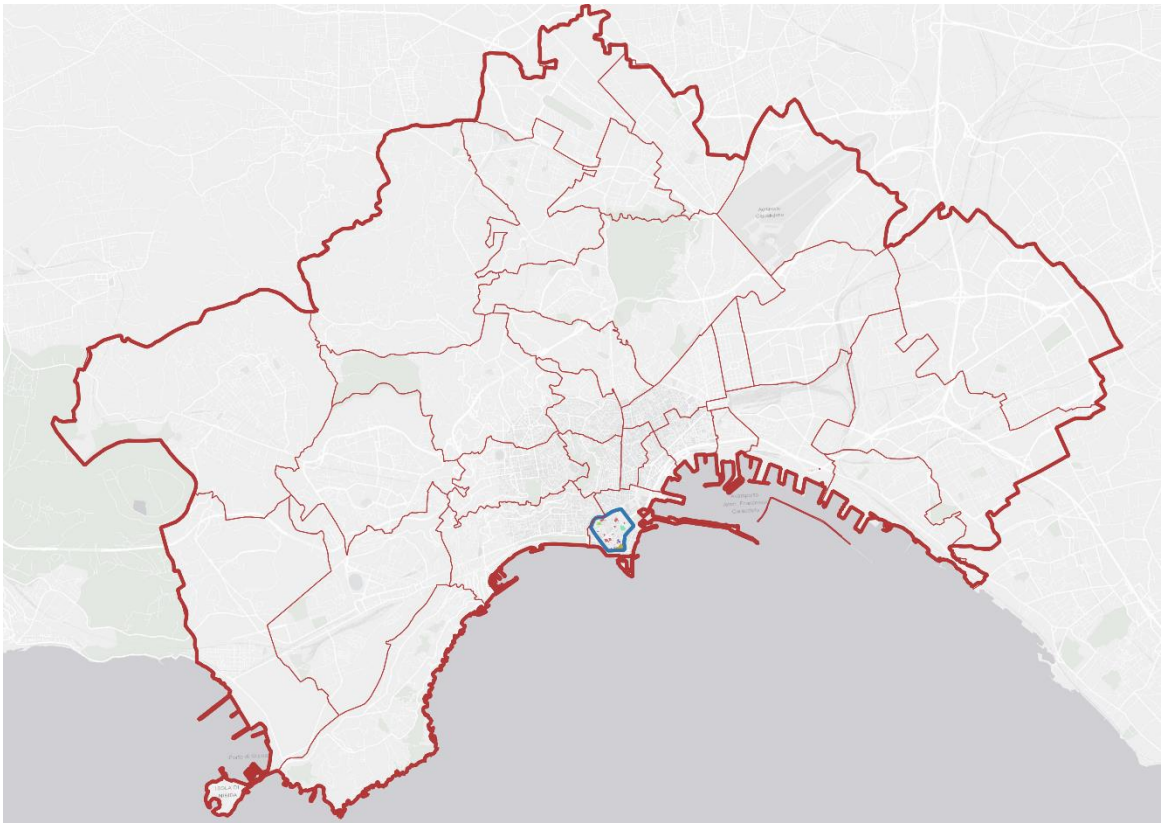

Fig.2 Delimitation of the study area in the City of Naples

This application proposes the transformation of Pizzofalcone by using active mobility measures that are considered as an engine of regeneration, competitiveness, and redevelopment of the historic centers. Through the redevelopment of pedestrian paths, the project proposal seeks to enhance connectivity, improve accessibility to services and cultural heritage and mitigate the problems of marginalization which affect this

specific area. The application to this case study has the double objective to assess the reliability of the developed operational procedure and propose the transformation of Pizzofalcone by exploiting the axes active mobility/ urban regeneration.

The project proposal wants to demonstrate the capacity of active mobility measures to work as a driver of regeneration, competitiveness, and quality of historic city centers. It highlights how the redevelopment of pedestrian paths could bring to the enhancement of connectivity, the improvement of accessibility to services and cultural heritage, and the alleviation of the problems affecting this particular area of intervention.

The project retraces the subsequent steps of the operational procedure, starting with the delimitation of the region, going ahead with the knowledge stage and then with the selection of the most suitable interventions customized to the needs of this specific case study.

5.1 Scanning the study area

The delimitation of the area (Fig.3a) hinges on the geomorphological shape of the territory, reflects the evidence of the archaic settlement and, above all, follows the streets network. It is worth mentioning that precisely its natural configuration has partially caused its current state of abandonment.

In particular the state of decay and degradation depending form the marginality of the area hinges on:

- the geo-morphological shape: the hill of Pizzofalcone is naturally bounded by a consistent different in height, defined by via Chiaia and Via Chiatamone; the hill slopes gradually to Piazza Plebiscito and the zone of Santa Lucia, areas created over time due to a process of cover-up that has lasted for thousands of years (Carsana et al., 2009);
- the perimeter of the archaic settlement: the perimeter follows the traces of the archaic settlement: the ridge of Pizzofalcone or Monte Echia coincides with the archaic settlement of Parthenope/Palepolis (Carsana et al., 2009), a settlement whose foundation was made around the first half of the seventh century b.C. (Giampaola & D'Agostino, 2005; Giampaola, 2009);
- the accessibility to the area: Pizzofalcone is delimited by streets characterized by low levels of pedestrian accessibility for and at the same time connects it with the surrounding areas. Via Chiatamone is a gap between the hill and the sea, connected with the top of the hill through the Lamont Young ramps and the lift of Monte Echia. Similarly, Via de Cesare and Via Serapide are connected with Pizzofalcone through the ramps and vico Storto Pallonetto that allow for a difficult access from Santa Lucia. Finally, Piazza Plebiscito, far from being an element of attraction and competitiveness for Pizzofalcone, has determined, since its foundation, the further closure and isolation of Pizzofalcone, making it an enclave impermeable to tourist flows, and passers-by who cross Piazza Plebiscito, continue towards the sea, bypassing the hill. The project phase will be aimed at overcoming this isolation, through the implementation of measures that increase the attractiveness of Pizzofalcone primarily from the tourist and cultural point of view. Tourist attractiveness, in fact, is a trigger for the competitiveness of the area for the effects it has on urban security, the promotion of culture, commercial activities and the economic sector.

The historical survey covers all the phases that have brought Pizzofalcone to its current shape. It allowed us to catch the main features and the vocation of the area along with the phenomena that have determined its urban evolution.

Another significant part of the study has consisted in the deepening of the relationship with the context. This phase has been essential to identify the inadequacy of vertical connections as one of the determinants of the area state of isolation. This observation makes clear why we have chosen Pizzofalcone to test the efficacy of active mobility measures to redevelop a territory affected by marginality. The regeneration of vertical pedestrian paths connecting the low part of the city with the hill of Pizzofalcone is necessary to enhance its built heritage and increase its competitiveness.

The SWOT analysis has figured out the strength, weakness, opportunities, and threats of the area, regarding social, cultural, environmental and urban aspects. In this regard, the inadequacy of vertical connections is one of the determinants of the area state of isolation. The demographic survey has highlighted the effects of the physical marginality of the area on the social and economic aspects. It was possible to highlight the substantial disparities that exist not only between the population of Pizzofalcone and the rest of the city center but also within the area of Pizzofalcone itself, through the analysis of data about population distribution, number of family members, differences between private housing and rents, levels of education and immigration. Furthermore, it was possible to identify public structures and open spaces, attractions and monuments, urban services and standard services by using the GIS.

The goal was to define, in a GIS model, the virtual network composed of the most attractive elements of the area that could represent the reference spatial background on which to implement the active mobility project. All these information has highlighted the existent relationship between low-quality streets and lower levels of accessibility and socio-economic issues. The area of Pallonetto is the most damaged by the lack of connectivity with the context and the nucleus in which there is a high concentration of criminality, economic inequalities and societal problems. Congestion, traffic noise, pollution, and inadequacy of pedestrian routes – ineffectually bounded by bollards – are some of the more limiting factors to active mobility. The regeneration of vertical pedestrian paths connecting the low part of the city with the hill of Pizzofalcone is necessary to enhance its built heritage and increase its competitiveness. In other cities, the improvement of public paths has been the key to overcome social disparities by raising attractiveness and aesthetic value, increasing the ease of getting around and making the streets safer and cleaner.

We detected afterward facilities, public empty spaces, attractions and sights, urban services, and standard amenities by using GIS. The aim was to visualize on a GIS model a virtual network among the attractive points to implement active mobility properly. We integrated the model with the localization of vertical connections, furthermore assessing their quality, conditions, and safety through several site visits.

By comparing information about the socio-economic dynamics and the level of accessibility of different zones, the negative impacts of low-quality routes have emerged. The area of Pallonetto is the most damaged by the lack of connectivity with the context and the nucleus in which there is a high concentration of criminality, economic inequalities and societal problems. Congestion, traffic noise, pollution, and inadequacy of pedestrian routes – ineffectually bounded by bollards – are some of the more limiting factors to active mobility.

(a) (b)

Fig.3 (a) Delimitation of the study area in OpenstreetMap (b) Project idea

5.2 The selection of the most suitable best practices

During the final stage of work, 25 prescriptive-planning documents have been drawn up by taking into account the strengths and shortcomings that emerged during the analysis phase.

ID	Guideline	Objective	Actions
1	Redevelopment of public spaces	Boost walking attractiveness	Redevelopment of streets, squares, public spaces
2	Adaptation to standard (DM 1444/68)	Increase citizens' opportunities	Enhancement of green areas, parking, public amenities, education services
3	Adaptation to climate change	Reduce the vulnerability of built heritage; Make the routes safer	Securing of the external finishes of the buildings
4	Adaptation to climate change	Reduce heat island negative effects on walkers	Raising the permeability of streets, avoiding paved and cement roads
5	Adaptation to climate change	Reduce heat island negative effects on walkers	Planting of leafy greens to create shaded walkways
6	Adaptation to climate change	Reduce heat island negative effects on walkers	Introduction of water areas and fountains in the built context
7	Sustainable mobility	Encourage active mobility	The establishment of cycle and pedestrian routes
8	Raising of the touristic attractiveness	Enhance points of interest attractiveness	Improvement of road signs, establishment of roof-bar, hotels, B&B, public terraces
9	Green infrastructure	Improve air quality, reduce noise	Creation of a walkable green network
10	Sustainable mobility	Reduce pollution, traffic, congestion	Promotion of bike-sharing and car-sharing
11	Adaptation of streets	Improve streets quality	Attention to street furniture, the makeover of bumpy and unsafe roads
12	Participation	Promotion of cultural heritage	Sensitizing campaign, events, visits and tours
13	Green infrastructure	Improve streets quality	Reforestation of urban areas, green courtyards
14	Sustainable mobility	Boost walkability through a better connectivity	Definition of how routes can be integrated into the urban fabric
15	Accessibility	Reduce difficulties of disadvantaged people in the access of facilities	Removal of architectural barriers, paths for disabled, visually impaired and blind people
16	Sustainable mobility	Reduce pollution, traffic, congestion	Tax benefits for public transport
17	Urban regeneration	Ensure the continuity of paths and the connectivity with the context	Redevelopment of strategic points of connection, assurance of the continuity of cycle paths and walkways
18	Sustainable mobility	Reduce pollution, traffic, noise	Promotion of LTZ, temporary cycle paths,
19	Raising of the touristic attractiveness	Increase the flow of passers-by	Installation of artworks along the paths
20	Green infrastructure	Reduce noise, improve public health	Promotion of households gardens along the paths
21	Participation	Ensure routes cleanliness and quality	Involvement of the population in the recovery and the maintenance of the area
22	Participation	Reduce social distress	Creation of meeting points within walking distance
23	Land use optimization	Create public spaces and new opportunities	Redevelopment of residual spaces to improve connectivity
24	Safety mobility	Reduce criminality, improve safety of pedestrian routes	Optimization of means of control and security, video surveillance, alert systems
25	Safety mobility	Reduce criminality, improve safety and quality of pedestrian routes	Improvement of street lighting systems

Tab.2 The prescriptive planning documents developed for the project proposal of Pizzofalcone

The documents are the results of the selection of the most suitable initiatives and best practices resulted from the study phase, and, subsequently, the adaptation of the lines of action to the specific needs of Pizzofalcone. The interventions proposed deal with the green infrastructure, the recovery of public spaces, the mitigation of heat island adverse effects on walkers, the integration between soft mobility and public transport, the continuity of paths and the connectivity with the context, urban quality, and participation of citizens. The purpose is to improve accessibility and competitiveness of the area by defeating social, cultural and economic problems affecting Pizzofalcone. Not only could the benefits concern Pizzofalcone's walkability, but also its accessibility and, consequently, its competitiveness at the provincial scale. Promoting such interventions would lead to an appreciable number of opportunities to which inhabitants and city users have access and even a considerable competitive advantage in properties value and citizens' lifestyle. The project starts from the identification of an axis going from Piazza Santa Maria Degli Angeli to the viewpoint of Monte Echia, passing through different attractive points – foremost the public lift and the Linea 6 metro station (Fig.3b).
Following the subsequent steps of the operational procedure, we drew up 25 prescriptive-planning documents by taking into account the strengths and shortcomings that emerged during the analysis phase. We elaborated the documents starting by selecting the most suitable action and initiatives from the matrix of best practices, proceeding with the adaptation and development of the lines of actions to the specific needs of Pizzofalcone. The interventions proposed deal with the green infrastructure, the recovery of public spaces, the mitigation of heat island adverse effects on walkers, the integration between soft mobility and public transport, the continuity of paths and the connectivity with the context, urban quality, participation of citizens. All the guidelines and actions considered could improve accessibility and competitiveness of the area, allowing defeating social, cultural and economic problems affecting Pizzofalcone. Tab.2 reports synthetically the actions that, according to our logic, can bring to a substantial renewal of the area by promoting active mobility within the field of urban regeneration. Not only could the benefits concern Pizzofalcone's walkability, but also its accessibility and, consequently, its competitiveness at the provincial scale. Promoting such interventions would lead to higher levels of accessibility, an appreciable number of opportunities to which inhabitants have access and even a considerable competitive advantage to properties value and citizens' lifestyle.

5.3 The project proposal

During the final stage of work, 25 prescriptive-planning documents have been drawn up by taking into account the strengths and shortcomings that emerged during the analysis phase. The documents are the results of the selection of the most suitable initiatives and best practices resulted from the study phase, and, subsequently, the adaptation of the lines of action to the specific needs of Pizzofalcone. The interventions proposed deal with the green infrastructure, the recovery of public spaces, the mitigation of heat island adverse effects on walkers, the integration between soft mobility and public transport, the continuity of paths and the connectivity with the context, urban quality, and participation of citizens. The purpose is to improve accessibility and competitiveness of the area by defeating social, cultural and economic problems affecting Pizzofalcone. Not only could the benefits concern Pizzofalcone's walkability, but also its accessibility and, consequently, its competitiveness at the provincial scale. Promoting such interventions would lead to an appreciable number of opportunities to which inhabitants and city users have access and even a considerable competitive advantage in properties value and citizens' lifestyle. The project starts from the identification of an axis going from Piazza Santa Maria Degli Angeli to the viewpoint of Monte Echia, passing through different attractive points – foremost the public lift and the Linea 6 metro station (Fig.3b).
The project has taken shape by developing 5 axes, respectively:

- the network of the main pedestrian and cycle paths;
- the relationship between full and empty spaces within the urban fabric;
- the courtyards in via Monte di Dio and the attractiveness of routes;

- the "edge" of Pizzofalcone and the vertical connections with the context;
- the construction of a green infrastructure to improve walkability.

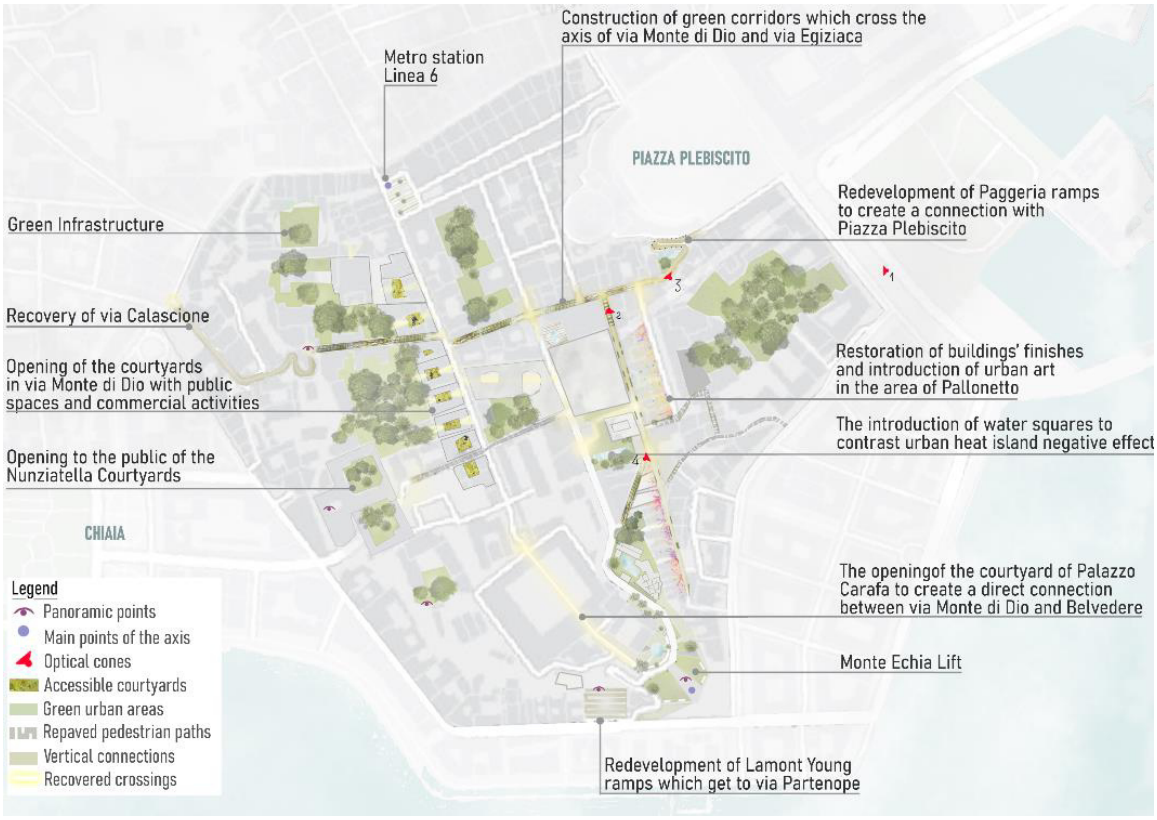

Fig.4 The project of redevelopment proposed to improve Pizzofalcone accessibility and attractiveness, by promoting active mobility

Once the axis that connects the square to the lift has been defined, the work has proceeded with the identification of potential transversal paths which cross the hill, enhancing the connectivity between the zones of Chiaia, Pallonetto, via Egiziaca and Piazza Plebiscito, one of the hotspots of the city of Naples. The proposal consists in creating green walkable corridors, LTZ and temporary cycle paths capable to address passers-by to the most significant points of interest, with the double effect of improving walkability and valorising cultural built heritage within the historical center.

Fig.5 The recovery of Paggeria ramps - at the current state on the left hand side and after the intervention on the right - proposed to improve the connectivity between Pallonetto and Piazza Plebiscito (photoinsertion by the authors)

Moreover, the improvement of streets light system and street furniture, the optimization of means of control and security, such as video surveillance, alongside the makeover of bumpy and unsafe roads are necessary, especially for those walkways which suffer degradation and isolation.

The removal of architectural barriers is essential to ensure the same level of accessibility to the whole population, not discriminating disadvantaged people. As regards the second bullet point, the redevelopment of residual spaces is another means to improve connectivity, since it gives the chance to create public spaces and new opportunities for citizens within walking distance, optimizing land use. The viewpoint would be reforested and provided with urban furnishing, water pools, cultural activities to enhance its attractiveness and to create an aggregation area.

Fig.6 The redevelopment of Piazzetta Nino Salazar - at the current state on the left hand side and after the intervention on the right (photoinsertions by the authors)

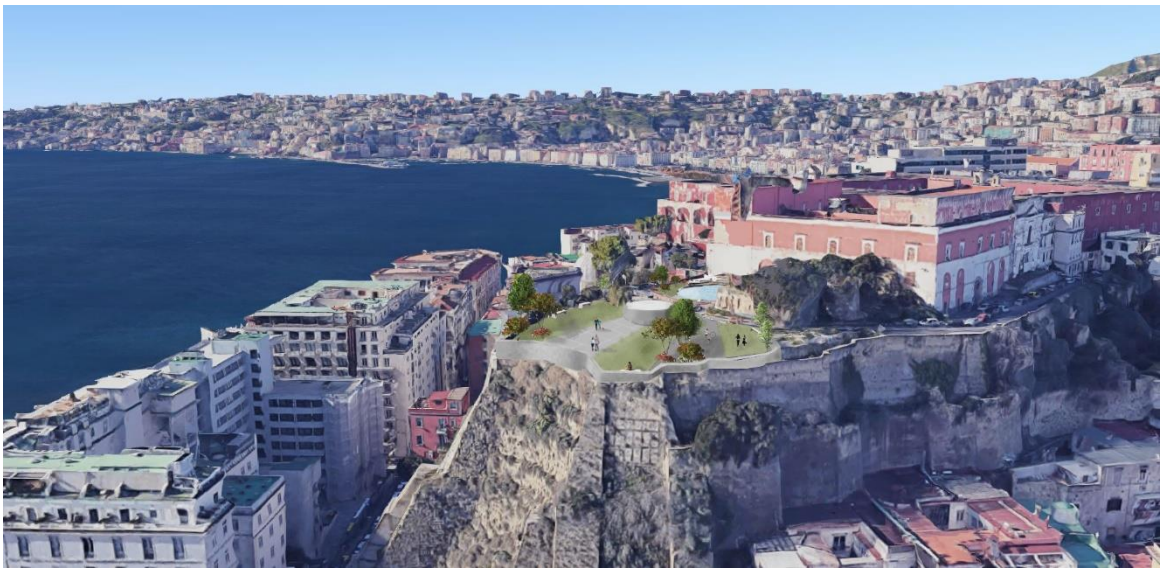

Fig.7 The redevelopment of the view point of Pizzofalcone (photoinsertions by the authors)

Connectivity should be enhanced also by drawing paths within the urban fabric: the plan proposes the publicizing of some spaces like the via Monte di Dio courtyards, obtainable in accordance with the City of Naples. The idea is to accomplish, within these courts, public spaces equipped with gardens, bars, and commercial activities.

The promotion of street art and the installation of artworks along paths can improve the quality of urban routes, boosting places' attractiveness, as demonstrated by numerous best practices. These measures should be accompanied by the improvement of road signs, establishment of roof-bar, hotels, B&B, public terraces. Such initiatives attract a lot of tourists and passers-by, with positive effects on public security and criminality. In the light of this, sensitizing campaigns, tours and events could support the active mobility and regeneration

combination through the promotion of cultural heritage. They would create added value on the territory with little economic effort.

(a) (b)

Fig.8 The promotion of street art in (a) Pallonetto a Santa Lucia stairs and (b) vico Solitaria (photoinsertions by the authors)

Urban safety should be improved securing the external finishes of the buildings with the double benefit of reducing the built heritage vulnerability and making the routes safer. Considering the implications of climate change, we proposed to reduce heat island negative effects on walkers by raising the permeability of streets, avoiding paved and cement roads, planting of leafy greens to create shaded walkways, and introducing water areas and fountains in the built context.

Concerning the topic of the edge, the redevelopment of the vertical connections is the pivotal point to regenerate the area through the active mobility approach. Different hotspots have been identified: the recovery of the pedestrian connection between via Calascione and via Chiaia; the commissioning of the Nunziatella historical lift; the redevelopment of the Lamont Young ramps and the Paggeria ones; the resurfacing of Vico Storto Pallonetto; the renewal of via de Cesare and via Serapide. The redevelopment of strategic points of connection ensures the continuity of walkways and the connectivity with the context, which lack has been causing the area isolation for centuries.

(a) (b)

Fig.9 The redevelopment of and the improvement of the lighting system of (a) Vico storto Pallonetto and (b) Lamont Young ramps (photoinsertion by the authors)

The green infrastructure would be constructed through the dissemination of green areas and public gardens kept together through connection greed made up by pedestrian routes, reforested areas and green courtyards. The creation of a walkable green network might improve air quality and reduce noise, pollution, and traffic congestion, finally enhancing the quality of life of Pizzofalcone's inhabitants.

Fig.10 The pedestrianization of via Pallonetto with the creation of green corridors - at the current state on the left hand side and after the intervention on the right (photoinsertions by the authors)

6. Conclusion

The results of the study highlight the role of active mobility as a means of urban regeneration in historic city centers. The promotion of active mobility provides substantial benefits to a wide range of aspects related to the quality of life, enabling, at the same time, the valorization of the cultural, landscape, historical and architectural value of the territory. The multidimensionality of urban regeneration has allowed for considering walkability and quality of routes as essential elements of accessible and competitive cities. Furthermore, promoting active mobility includes low-cost measures and actions with a modest impact on the urban fabric, which often have to cope with listed buildings and landscape restraints in these specific contexts. The case study of Pizzofalcone constitutes an application work intended to deepen the possibility to apply the outcome of the scientific framework about the relationship between the promotion of active modes of transport and urban regeneration to real cases. Pizzofalcone has represented the ideal area of application, because of its lack of integration with the rest of the historic city center, despite its cultural value. The proposed project could be an interesting and economical solution. Although it considers only active mobility measures, it takes into account the possible horizontal effects which regard different critical aspects of Pizzofalcone. The project could be the starting point of a more complete process of regeneration intended to return Pizzofalcone to be a fundamental hub for the city and a crossing point for a multitude of people. The results of the work show the potentialities of active mobility measures in the regeneration of historic districts characterized by marginality and socio-economic problems, in order to address their development towards higher levels of accessibility and competitiveness. Given the quantitative approach of the urban accessibility and competitiveness studies, future development of the present work would concern the measurement of the positive impacts that active mobility regeneration measures can have on cities levels of accessibility or competitiveness.

Author Contributions

The work, although the result of a common reflection, was divided as follows: Carmela Gargiulo wrote paragraphs 1, 4 and 6; Sabrina Sgambati wrote paragraphs 2,3 and 5.

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Image Sources

Fig.1, 2, 3b, 4, 5, 6, 7, 8a, 8b, 9a, 9b, 10: Authors;

Fig.3a: OpenstreetMap.

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