Italian High-Speed Railway Stations and the Attractivity Index: the Downscaling Potential to Implement Coworking as Service in Station

Anna Giulia Castaldo[1] · Ferdinando di Martino[2] · Barbara Cardone[2] · Francesco Domenico Moccia[2]

Abstract

This article introduces a methodology to evidence the current attractiveness level of Italian high-speed railway stations in a GIS environment, involving station services and flow parameters. The model has been relevant to detect stations with lower attractive capacity, and afterward, to implement the station attractivity, the work proposed employing a coworking spaces strategy as a service in station. Coworking spaces produce benefits both for the traveler and the transport company. These places became part of the services offered within railway stations since they are flow providers able to change appearance and idea of experience at station. In France, a coworking strategy has been created from the collaboration of Regus, leader company in coworking spaces supply, and the French railway group (SNCF). The Italian railway company (Ferrovie dello Stato) does not consider the attractiveness potential of coworking in the management of station resources; coworking spaces in Italy are placed outside stations. Accordingly, Torino Porta Susa station has been identified as one of the stations with low attractivity capacity from the methodology implemented, and it has been chosen as the case study to implement the coworking strategy. The choice of Torino Porta Susa is accurate also for showing the value of associating coworking as urban policies support. The coworking strategy can implement attractiveness levels and, in a long-term future perspective, encourage sustainable mobility targets.

Keywords High-speed railway stations · Services · Coworking spaces · Attractivity

✉ Anna Giulia Castaldo
   annagiulia.castaldo@polimi.it

Extended author information available on the last page of the article

Introduction

The railway system has always played the role of *activator* of many urban phenomena. It embodies the foremost level of accessibility and allocation of activities of the city core. This can be seen in historical examples, such as the Grand Central Terminal station in New York, which was a local milestone in providing sustainable daily commuting from suburban to central areas (Moccia, 2011) and, in the meantime, a cluster pole of high-rise office buildings development.

Today stations in the major European metropolitan cities are emerging as hubs of networks (Mulders-Kusumo, 2005). It concerns a multi-scale dimension that emerges as a result of the convergence of multiple transport integration, where rail tracks come from different directions and often countries (Dragan, 2017), and including local and regional businesses around them (Paul Rodrigue, 2006).

This change accommodates new urban functions, in favour of traveller's experience and citizens, who live the spaces of the station as spaces of the city, supporting the principle that planning and designing a station means provide a space with functions of a "node and place" (Bertolini & Pasquier, 1996:89). The high-speed railway stations in Italy show excellent demand performances, but they are among the European worst cases for construction costs. As reported by Beria et al. (2018), some stations, outside cities and in addition to the existing central stations, have been designed by famous international architects, catchy buildings presented as landmarks. Construction costs have reported amounts ranging from 60 M€ to 350 M€, but they are redundant in terms of space available to travellers and subsequently of cost.

This underlines the great attention given to investments in high-speed stations, but also emphasizes the need to harness the design and investment efforts produced. One of the potential strategies to implement station attractivity is increasing services. Station services can be divided into (i) merely transport service, (ii) commercial service, (iii) services maximizing time spent in the station (Menerault, 2006). The last one includes coworking spaces as a service.

Since 2016, The French institutional railway company SNCF has been implementing a coworking network in stations, transmitting the potentiality of this service for the railway station attractivity within the campaign for new services, retail and community spaces called "Work&Station" (Richer, 2017). In Italy, the partnership between coworking companies and the railway infrastructure has been partially faced. The coworking companies place their facilities within the urban context but outside stations. In France, the railway company has marked this collaboration with the company Regus, leader in providing coworking spaces.

Coworking is a well-known style of work that has seen a particular growth since 2009, mainly due to the economic crisis and the depression of the office real estate market (Deskmag, 2012; Moriset, 2017). It has also flourished following the innovation of technologies linked to simplified information and knowledge access, so that the choice of working place becomes more flexible, independent of time and space (McCann, 2008). Coworking spaces are shared work environments, bringing benefits to the space and its user, reducing work isolation from

home and providing profit for the host structure. These workspaces can be established in multiple locations, such as libraries, cafes, restaurants, hotels and airport lounges (Mariotti & Akhavan, 2019). In the literature, the positive effects produced by coworking spaces on the urban context have been highlighted in different terms: opening of new neighbourhood activities and new amenities with neighbouring businesses, awareness-raising events and cultural activities (Mariotti & Akhavan, 2019), development of collaborative economy (Perrin & Aguilera, 2017), development of creative districts (Mariotti et al., 2017; Moriset, 2014), stimulation of urban development (Bednář & Danko, 2020).

Railway stations are also attractive locations for establishing coworking spaces, with localization features that make stations suitable for this typology of activity: they are hugely integrated into public transport, introduce offices in quality locations, and place workers in immediate proximity to departing railway flows. Spatial impacts and usage effects within railway stations are still little investigated, although they may represent a field of study of great importance. The scientific community's attention to the topic has grown considerably in recent years, according to the increasing number of reported studies, i.e. doctoral theses on this topic recently born (from 2012 to 2017 were 30) (Scaillerez & Tremblay, 2017).

Hence, this work aims to provide a methodological approach to set the level of attractivity of the Italian high-speed stations. The methodology is focused on services potential and flow parameters; afterwards, it works on the implementation value of coworking services. This study can define the level of attractivity of stations and target stations with low attractivity value for planning policy implementation. Therefore, the work has the purpose of answering the following research questions:

(1) What are the attractiveness levels of Italian high-speed railway stations?
(2) Can coworking increase the attractiveness of these railway stations?

Torino Porta Susa station is presented as the case study to implement a coworking spaces strategy in station according to the following aspects: (i) the ability attraction has a low value considering its potential; (ii) coworking strategy in Torino Porta Susa can stimulate, in a long-term perspective, the sustainable mobility interventions promoted by the station and the spaces adjacent station. The final case-study reports this simulation conducted in GIS environment.

Coworking Spaces Strategy in French and Italian Railway Stations—A Review

The presence of coworking spaces in the urban context produces impacts of different nature. It changes the volume of urban traffic, since it also changes the routes of home-work journeys. Literature on the subject also highlights the capacity of these spaces to make the territory more attractive (Lafontaine et al., 2013). In this respect, the debate on the appropriate location of such spaces based on actual needs is in the spotlight (Beaume & Susplugas, 2010), where some argue

that they should be located within the core of large cities, while others disagree, affirming they should be positioned in places where there are currently few coworking spaces, e. g. in the suburbs and peripheries —promoting suburb-based coworking centres can possibly be beneficial for the environment by reducing the traffic associated with coworking space users (Yu et al., 2019). Coworking spaces and high-speed stations relationship is well examined in the literature, underlining the location of offices around the stations. The introduction of the highspeed system had encouraged users and entrepreneurs to request a new real estate market around the stations, due to the positive message sent by city administrations and institutions at a time when many urban development projects were born around them (Pagliara et al., 2016). On the other hand, the relationship that arises with railway company, in the role of provider of indoor spaces, and private companies operating in temporary offices field, in the role of users, such as Regus, Buroclub, Cowo, Multiburo, is less studied. This collaboration can increase the idea of station as place and node and represent a strengthening of the phenomenon of metropolization of the stations.

According to distinct key points, the station's role as a space provider is noteworthy. Firstly, there are many stations that currently have unused space and are often subject to urban regeneration, requalification, and social reuse projects. Secondly, the rental of offices in station represents a commercial innovation of *relational nature* (Berry & Dupuis, 2005; Perrin & Aguilera, 2014), or also expressed as an *external relationship* (Aguilera et al., 2013; Djellal & Gallouj, 2002). It is the creation of a new kind of relationship between different actors, where on one side, we have the service providers and their possible customers, and on the other, station managers and railway operators with the function of space providers and managers. As reported by Gallouj and Weinstein (1997), coworking is already in itself an innovation in services. In fact, the provision of temporary offices represents an *incremental* innovation in the service since it adds one or more features to an existing one. In this case, the service's innovation concerns the rental of buildings and the profile of the real estate agent, who can thus offer modular services, with a considerable simplification of administrative procedures and at the same time the equal and adequate technical and administrative support. Finally, one of the essential advantages of locating these spaces in the station is optimizing the time spent in the station. The introduction of temporary workplaces within transport infrastructure took place in US airports for the first time in 2006.

Afterwards, in 2007 Regus began to put its coworking spaces strategy in railway stations into practice. The private company proposed the offer of shared and temporary offices within stations to the SNCF (Société Nationale des Chemins de fer Français) in France, for the stations of the high-speed system and small and medium-sized stations, first in favour of peripheral stations, then towards the central poles — the high-speed stations (Richer, 2017).

The implementation of this strategy has been an innovation, especially for the railway operator, driving two central strategies: (i) in terms of building brand loyalty together with the development of the market for mobile workers; (ii) in terms of repositioning of stations as multi-service spaces within the metropolis (Aguilera et al., 2013).

The implementation of the Coworking strategy in France may also be due to two strategic trends. The first is the approach of redefining spaces with the opportunity to the high-speed arrival in urban contexts. It is the case of several French cities: Reims, linked to the launch of TGV Est in 2007, has undergone a series of redevelopment projects, for instance, the Claimarais car park is one of the several programmes linked to the renovation of a new neighbourhood built in that occasion, comprising offices and housing, other buildings and green spaces. The second one is the ability to create innovative networks via spatial projects. Here, stations become interface projects between entrepreneurial-economic networks and urban nodes. EuraLille's strategy project is an excellent example of a new urban node and innovative actors' network. Lille created an interface between research (universities and laboratories) and companies.

These interfaces acted as a hub and facilitated information flows. In Italy indeed, Regus has also established a partnership with Ferrovie dello Stato (FS), which provides Trenitalia customers with the opportunity to use the 10 Regus centres located in central districts of cities such as Turin, Rome and Milan, providing discounts on rental meeting rooms, day offices, and videoconferencing services. However, this strategy is different from the model developed in France, because, above all, it does not take place inside the stations. It provides discounts on the rental of workspaces not for all types of travellers, on behalf of a system more focused on long-distance travellers who stay for a short time in city, so it does not provide a continuous facilitated formula for commuters.

Methodology

Attractiveness: The Definition of the Indicator for Railway Stations

The attractiveness of a railway station is its ability to attract users, services and investments. There is no single definition in literature to describe the concept. From an economic perspective, attractiveness is about demand and supply. For urban and regional studies, attractiveness can be defined as the ability of places of attracting, and can be translated into positive or negative impacts on the places themselves (Servillo et al., 2012), therefore, it does not result in being a static value. It can also be assessed for whole regional contexts through growth indicators or indicators of economic development, in order to define the region's competitiveness (Hallin & Malmberg, 1996).

It could be the case also of individual areas within the urban context, where, in addition to growth and economic indicators, other parameters can be associated to assess the attractiveness of a place. For example, accessibility may be a valuable parameter, namely measuring the attraction or the potential attraction of a place relative to other places (Fotheringham & O'Kelly, 1989; Harris, 2001; Taaffe, 1996).

This parameter is often used to assess the stations' attractiveness, as increased accessibility has significant positive effects on the urban environment and economic growth (Zhang et al., 2016). The station's attractiveness can also be assessed as the ability to catalyze investment, according to the capacity of a place to convince the

public actors to locate their projects in that territory rather than others (Hatem et al., 2004). In fact, it involves afterwards creating urban spaces for leisure, culture, commercial activities, able to attract flows of tourists, visitors, and inhabitants (Ingallina, 2008).

In the perspective of this work, the theoretical approach on which the model was built has been the idea of "node and place" of Bertolini and Pasquier (1996:89). Level-of-service in stations follows this perspective, defining the quality of the transport node (Willigers & Van Wee, 2011).

According to these parameters, understanding the attractiveness of the major high-speed stations means recognizing stations well served and ones requiring more attention since not quite attractive. Afterwards, Coworking services implementation, as an incremental development factor, represent the last step of the methodology. The Italian high-speed stations considered in this study are those defined by FS as stations designed to perform the functions of significant transport, commercial, cultural, urban and territorial redevelopment hubs1: Roma Termini, Roma Tiburtina, Napoli Centrale, Napoli Afragola, Firenze Santa Maria Novella, Firenze Belfiore, Reggio Emilia AV Mediopadana, Bologna Centrale AV, Venezia Santa Lucia, Milano Porta Garibaldi, Milano Centrale, Torino Porta Susa. Station data is derived from public information provided by the national railway operator websites. Napoli Afragola and Firenze Belfiore are included in the list because they correspond to the characteristics of hubs, but reliable data on them could not be obtained because Afragola station opened in 2017, and Firenze Belfiore station is not yet open to the public. In Fig. 1, the workflow for calculating the attractiveness indicator through a tree diagram is represented. Attractiveness is expressed through "the final synthetic indicator of the ability attraction", calculated in a Geographic Information System (GIS) environment. The attractiveness indicator is calculated as a synthesis of the three indicators of level 01: the indicator of services and activities supply (Indicator services/activities), codified concerning their occurrence; the indicator of social affluence in station (Indicator Passenger Flows); the indicator representing the importance of the station according to FS strategy through the rail traffic analysis (Indicator Importance of the intermodal rail system). Also, level 01 represents a low-level synthesis (level 02). The process was developed using the ArcMap tool, employing the functionalities of Fields Calculator.

The essential data are contained in level 02, which in fact constitutes the "knowledge" of the system. The Indicator services/activities is represented by the services and activities in station inside the passenger building. The parking spaces considered are those immediately adjacent to the station spaces. The services presented include rail, commercial, and logistics services for accessibility. The choice to use station services and activities as data type in the calculation of the final indicator is due to the idea of overcoming the concept of station as a simple node, but increasing the idea of place instead. The Indicator Passenger Flows is the daily and the annual number of station visitors. The data were obtained from the railway company, and represent aggregate data without distinguishing commuters, long-distance travellers and citizens. The last indicator, Indicator Importance of the intermodal rail system, is the number of daily train journeys in station. The choice to use this type of data in calculating the final indicator is used to identify, through rail traffic data, the most
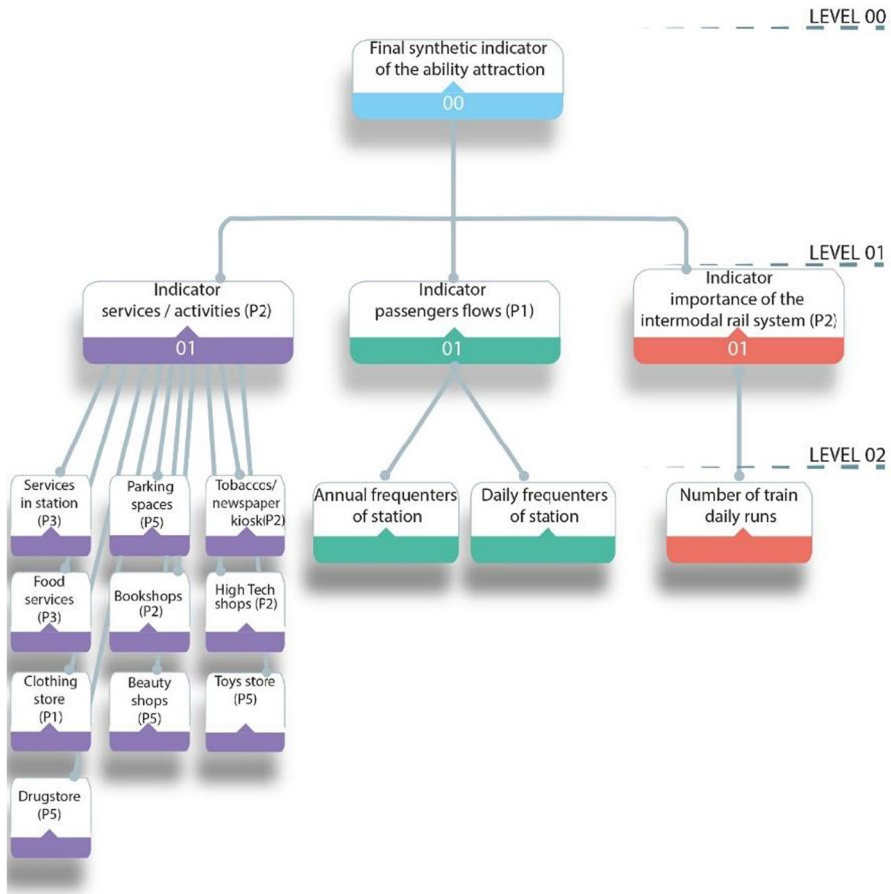
Fig. 1 The tree map chart of the final synthetic indicator of the ability attraction. Elaboration by the authors

significant stations and line sections. These data were also obtained from the information provided by the railway company.

Establishment of Indicator

A database in GIS environment – using the software ArcGIS – has been constituted collecting data related for the whole group of Italian high-speed stations. Prior to the starting of the process, we have deduced through interviews the typologies of services more and less important, assigning a weight according to the importance given to the services. This was the case of Indicator Services / Activities, where the number of the parameters and data were numerous and diversified. The interviews were conducted face-to-face with structured interviews from October 2019 to February 2020. The number of citizens interviewed in the two stations was 120 for Napoli Afragola and Napoli Centrale railway stations. We

Fig. 2 The table of Weights/Value. Elaboration by the authors

Weight	Value
P1	5
P2	4
P3	3
P4	2
P5	1

also interviewed the retail managers in the two stations, corresponding to the activity's chiefs. The table of weights and their associated values is depicted in the Fig. 2.

Afterwards, data crossed a process of data normalization. In particular, level 02 has undergone this phase since the summarization of data flows from heterogeneous sources would be biased without normalization. The process of data normalization has enhanced data productivity. The normalization process has been affected considering a data field and its ampleness, creating a normalization between 0 and 1. The data of "Annual frequenters", "Daily frequenters" and "Number of train daily runs" have undergone the process of data normalization, but with also a classification in 5 classes. The five classes have been definite according to study an equal interval. Finally, in order to calculate the "Passenger Flows" indicator, only one parameter has been considered between "Annual frequenters of station" and "Daily frequenters of station". Indeed, there is a strong linear correlation between the two parameters, observing the correlation coefficient next to 1, as reported in Fig. 3. They have been reported together for greater completeness to support the calculation.

A weighted average was made with the data normalized, and then classified into five classes, according to the study of an equal interval as in previous cases. Thus, in the image underlying (Fig. 4), the graphic representations of the three intermediate
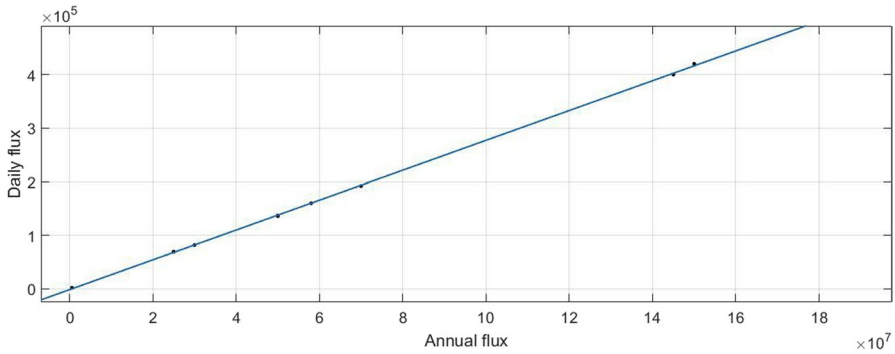
Fig. 3 Solid blue line: linear fit of daily flux vs. annual flux (black dots). Elaboration by the authors

indicators are reported, showing the first results obtained through the model. The calculations of the three indicators were performed in a GIS environment with ArcGIS software.

Then we also have established weights for the three intermediary indicators (only P1-P2) and effected a weighted average among the three ones. Such result brought to the final synthetic indicator of the ability attraction, which has been classified into five classes: very low, low, medium, high, very high (Fig. 5).
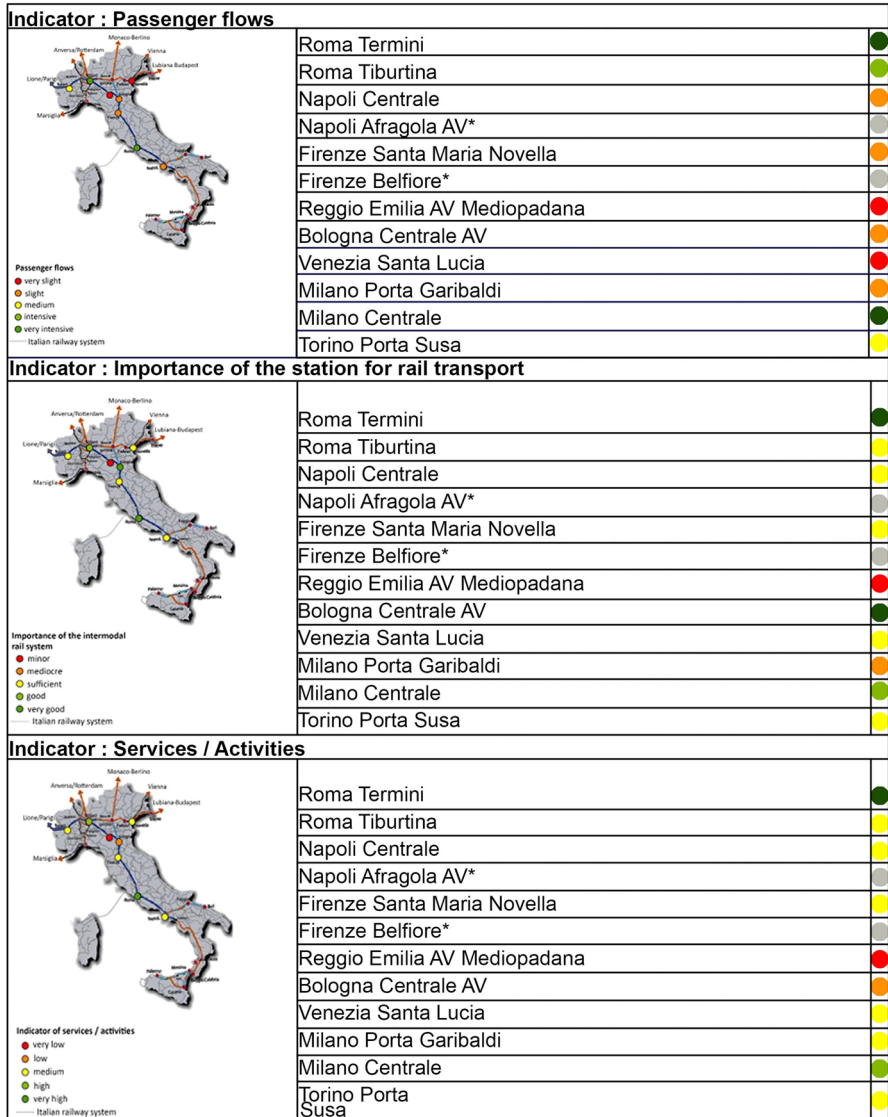
Final synthetic indicator of the ability attraction formula:

$$\frac{\sum_{i=1}^{n} p_i I_i(x_i)}{\sum_i p_i}$$

where:

- n =# of indicators
- p_i =weights of indicators
- $I_i(x_i)$ = value function used to classify the i-th variable at the intermediate level 01
- x_i = raw indicator values

In the image below we have shown the high-speed stations according to the final synthetic indicator of ability attraction, in decreasing order. In the first places the principal Italian high-speed stations — Rome and Milan — are displayed. The majority of others are found on a middle value, while the degrees "low" and "very low" are associated with Milano Porta Garibaldi, Venezia Santa Lucia, Reggio Emilia AV Mediopadana.

Indicator : Passenger flows

Roma Termini	🟢
Roma Tiburtina	🟢
Napoli Centrale	🟠
Napoli Afragola AV*	⚪
Firenze Santa Maria Novella	🟠
Firenze Belfiore*	⚪
Reggio Emilia AV Mediopadana	🔴
Bologna Centrale AV	🟠
Venezia Santa Lucia	🔴
Milano Porta Garibaldi	🟠
Milano Centrale	🟢
Torino Porta Susa	🟡

Passenger flows
- 🔴 very slight
- ⚪ slight
- 🟡 medium
- 🟠 intensive
- 🟢 very intensive
- Italian railway system

Indicator : Importance of the station for rail transport

Roma Termini	🟢
Roma Tiburtina	🟡
Napoli Centrale	🟡
Napoli Afragola AV*	⚪
Firenze Santa Maria Novella	🟡
Firenze Belfiore*	⚪
Reggio Emilia AV Mediopadana	🔴
Bologna Centrale AV	🟢
Venezia Santa Lucia	🟡
Milano Porta Garibaldi	🟠
Milano Centrale	🟢
Torino Porta Susa	🟡

Importance of the intermodal rail system
- 🔴 minor
- 🟠 mediocre
- 🟡 sufficient
- 🟢 good
- 🟢 very good
- Italian railway system

Indicator : Services / Activities

Roma Termini	🟢
Roma Tiburtina	🟡
Napoli Centrale	🟡
Napoli Afragola AV*	⚪
Firenze Santa Maria Novella	🟡
Firenze Belfiore*	⚪
Reggio Emilia AV Mediopadana	🔴
Bologna Centrale AV	🟠
Venezia Santa Lucia	🟡
Milano Porta Garibaldi	🟡
Milano Centrale	🟢
Torino Porta Susa	🟡

Indicator of services / activities
- 🔴 very low
- 🟠 low
- 🟡 medium
- 🟢 high
- 🟢 very high
- Italian railway system

*: Napoli Afragola AV and Firenze Belfiore stations at the time of the study did not have the necessary data as still inactive

High-speed infrastructure

in planning stage	——
under construction	——
in service	——
in service (<250km/h)	——

Fig. 4 The three intermediate indicators for the Italian High-speed railway station. Elaboration by the authors
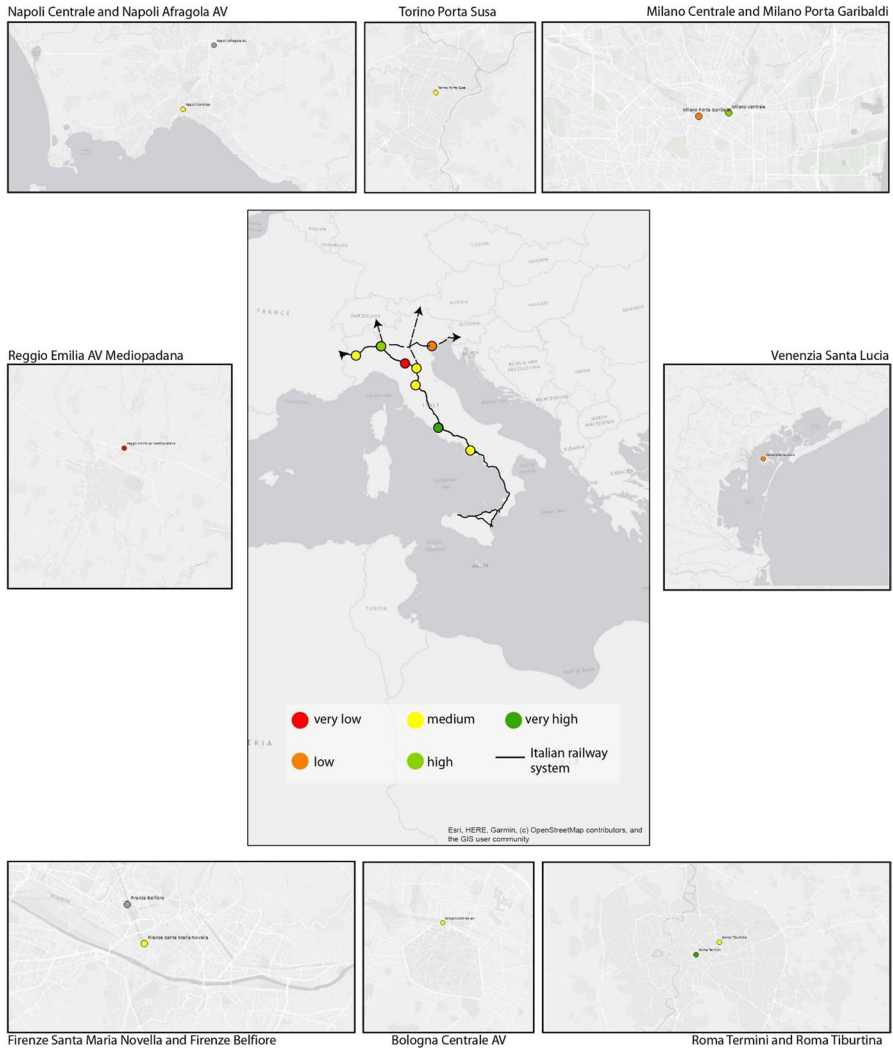
Fig. 5 The final synthetic indicator of the ability attraction for the Italian intermodal high-speed railway station. Elaboration by the authors

Discussion

The methodology exposed different values in terms of the attractiveness of Italian high-speed stations. The study enriches the group of studies defining indicators on railway stations at city level (Zhang et al., 2021) since the attractiveness indicator includes network indicators, which reflect the role of stations on the network, and additionally includes the theme of station services as an assessment of the attractiveness of the specific station.

**List of intermodal high-speed railway station
in accordance with the final synthetic indicator**

Roma Termini	●	Napoli Centrale	○
Milano Centrale	●	Milano Porta Garibaldi	●
Roma Tiburtina	○	Venezia Santa Lucia	●
Torino Porta Susa	○	Reggio Emilia AV Mediopadana	●
Bologna Centrale AV	○	Firenze Belfiore	
Firenze Santa Maria Novella	○	Afragola AV	

Fig. 6 Values of final synthetic indicator of the ability attraction for high-speed railway stations in decreasing order. Elaboration by the authors

Figure 6 showed that these stations could be grouped into three distinct combinations: stations with very high levels of attractiveness, stations with medium levels of attractiveness, and stations with low levels of attractiveness. The category of stations with high levels is formed by the stations of Roma Termini and Milano Centrale. The value associated with Roma Termini shows very high peaks for all the intermediate indicators, in terms of passenger flow, services, and station's importance in terms of traffic. The value attributed by the method is sustained by external data not directly considered in this study, e. g. the station size, for which Roma Termini is the largest in Italy. In addition, Rome ranks fourth among the best railway stations in Europe according to the Consumer Choice Center (CCC, 2020) after London, Zurich and Leipzig, due to its two unique international destinations. Milano Centrale station matches the same group, but with a lower level of attractiveness (high). In this case, the CCC claims that Milan is one of the most remarkable railway stations for travellers, but that is in the deepest position of the favourite European stations for having a lower commercial offer than the others. The methodology supports this data by observing intermediate indicators, since Milan has a lower value for services and activities indicator (together with the station's importance in terms of transport), despite a very high value in the number of transit passengers.

The paper thus proves to contribute to the field of planning policy for railway stations with a vocation as urban hubs. Land-use planning for stations should focus on situations inside and outside the railway station (Zemp et al., 2011), and in this case, according to the theoretical aspects of land-use planning, the attractiveness indicator is based on conditions inside the stations and its transit flows. The work provides new information on the state of the stations and differentiates the stations into classes that can be interpreted differently.

On the other hand, the category of stations with average attractiveness values includes the more significant amount of stations. By comparing the value of the final indicators with the intermediate ones, it is feasible to appreciate a diversification of cases in the same category. For example, Roma Tiburtina station has a high passenger flow value, and Bologna Centrale AV station is of considerable importance in terms of rail traffic (very high value). The values which differ from the average category value in negative terms concern the stations of Bologna, Florence and Naples. Bologna records a low number of passengers (low), and Firenze Santa Maria Novella and Napoli Centrale register the exact figure. The last category

concerns the stations of Milano Porta Garibaldi, Venezia Santa Lucia and Reggio Emilia AV Mediopadana. The first two show slightly better cases as they have low attractiveness values (low), while Reggio Emilia is last. The data provided in this station shows a "very low" value for all intermediate indicators. The result denotes a different situation in terms of attractiveness compared to the other realities, but the station could probably show significant variations by sector if examined separately. The Venice Santa Lucia station presents as the worst indicator the passenger flow. This may be because Venezia Santa Lucia is not a transit station, so passengers change in the nearby Mestre station or due to the transportation airport flow. Also, in this case, the method exhibits its limit of not being able to appreciate an adequate evaluation of all the cases. Venice value is due to the comparison with the other stations' data, since every year copious international tourists visit the city. Milan Porta Garibaldi station, on the other hand, represents a better attractivity value for the level of services, in comparison to indicators of passenger flows and the importance of the station for rail traffic. This phenomenon can be explained by the competition with Milano Centrale, where all major high-speed trains pass and more passengers are registered.

Case Study Application: Torino Porta Susa Station

Torino Porta Susa station is presented as the case-study to implement a coworking spaces strategy in station according to the average level of ability attraction, and the imperative of encouraging sustainable mobility policies for which coworking strategy can stimulate, in a long-term perspective, interventions focused towards this aim.

Torino Porta Susa station is one of the new FS hubs, and currently has no shops or places that make it attractive, although it is located in a central position of the city and has a strong connection with the other historical station of the town (Torino Porta Nuova). In 2013 the station was declared the best in Europe, but currently has a passenger building with almost no services. In this sense, the case of Torino Porta Nuova appears useful to think about hosting new commercial and service activities. FS claims to have published calls for tenders to host commercial signs, trying to involve trade associations. The causes reported for the non-implementation are different: from overpriced rent prices, up to the high competition with Porta Nuova station. Allocating flexible workplaces as coworking means also reducing pollution and traffic congestion (Ge et al., 2018; Yu et al., 2019). Additionally, allocating flexible workplaces as coworking means also reducing pollution and traffic congestion (Ge et al., 2018; Yu et al., 2019). Northern Italy has been constantly exposed to chronic air pollution (Fattorini & Regoli, 2020), and Turin is among the five Italian cities with highest costs of atmospheric pollution (CE Delft, 2020). Close by Torino Porta Susa station, there are many activities related to the sustainable mobility policies installed by the municipality of Turin.

Table 1 Data assumed before the intervention scenario	Before the hypothesis of intervention	
	Surface of services in station	7 700mq
	Initial ability attraction (level)	Medium
	Surface of the station	47 500mq
	Percentage of services in station	16%

Table 2 Result data with the use of the model	Hyphotesis of increment of ability attraction	
	Spaces coworking and microworking	850 mq
	New surface of service in station	8 550 mq
	Increment of the ability attraction (level)	High

These interventions have two intentions: they meet those who have to move towards the station, and allow those arriving at the station to move towards the city. Coworking increases mobility policies by encouraging the use of sustainable means within the station, since mobility towards the city is being reduced. According to the web-service of info-mobility portal provided by Turin municipality,[1] close to Porta Susa station there are the following means of transport according to these buffer zones:

Distance	Typology
10 m	Electric scooter (1)
30 m	Bus
70 m	Bus
80 m	Bus
90 m	Bike station
100 m	Electric scooter (2)
300 m	Underground

Table 1 shows the initial data used in the assumption of an increase in station services, and Table 2 shows the change in data after the use of the model. In our hypothesis of expansion of the intermodal rail system we have inserted spaces of coworking and microworking as service in station. With the insertion of coworking and microworking spaces results an increase of attractivity level of the stations, because the two indicators, the intermediary one, the services and activities indicator, and final synthetic indicator of ability attraction, are positively correlated. Trough the inclusion of coworking spaces in station, the model shows that the indicator passes from yellow to green, or rather from level "medium" to "high", as
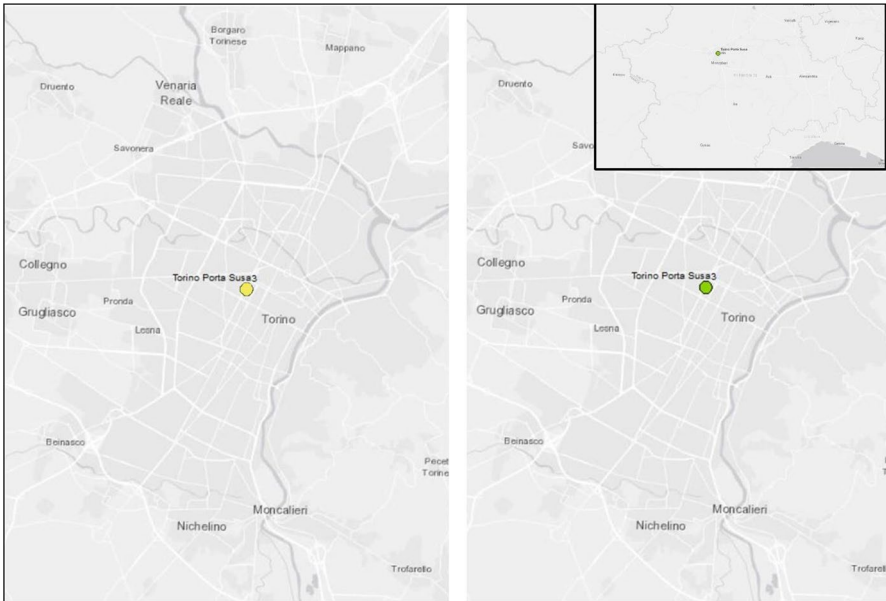
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[1] https://www.muoversiatorino.it/it/

Fig. 7 Localization of Torino Porta Susa railway station and associated final synthetic indicator. On the left, the indicator of Torino Porta Susa is coloured in yellow; on the right, with the exercise of simulation of coworking service implementation the indicator passes to green. Elaboration by the authors

shown in Fig. 7 which shows the color change of the indicator level directly from the screenshot of project in the GIS environment. In order to increase the level of attractiveness it was necessary to allocate 11% of space for the coworking service.

Conclusion

High-speed stations, beyond the concept of transport sites, are physical and authentic urban places. The methodology proposed in this article looks at stations in this way, identifying the indicator of their attractiveness. The most significant result of the work, in addition to the measurement at the national scale of the attractiveness values for each high-speed station, stands in the potential of differentiation of these values, which reflected the nature of single stations and demonstrated the ability to sustain the definition of differentiated support strategies for the city's policy objectives.

The contribution of the work is to have provided a working methodology based on station services and flow parameters. It has made possible to assess the nature of the Italian high-speed stations in a different way. The results obtained contribute to interventions and policies for the implementation of the stations as nodes and places, as well as to the policies of urban regeneration around the stations.

The values of station attractiveness, intersected with territorial specifications, represent a basis for defining specific interventions for the needs of individual stations

and urban contexts. This is the case of the Turin Porta Susa station, which showed a low level of attractiveness despite the supply of space. The coworking service was used as an incentive for attractiveness and in support of sustainable mobility policies. The coworking has been implemented in a context chosen, as a lever for additional strategies since often overexploitation of these spaces takes place behind the rhetoric of the creative city.

Also, the results suggest shedding light on the quantitative and qualitative verification of coworking benefits for the policies at the city level, and the implementation of the stations' attractiveness concerning the individual territorial conditions. These resulting potential co-benefits may be represented in the form of social, economic and environmental nature for the station and the surrounding urban context.

In addition, the studio faced the challenge of being unable to have specific information on Firenze Belfiore and Napoli Afragola stations. A further step-forwards for implementing this study would be to administer more extensive questionnaires on individual local situations and add data to the rest of the stations.

Declarations

Conflicts of Interest The authors declare no conflict of interest.

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Authors and Affiliations

Anna Giulia Castaldo[1] [ORCID] **· Ferdinando di Martino[2] · Barbara Cardone[2] · Francesco Domenico Moccia[2]**

Ferdinando di Martino
fdimarti@unina.it

Barbara Cardone
b.cardone@unina.it

Francesco Domenico Moccia
fdmoccia@unina.it

[1] Department of Architecture and Urban Studies (DAStU), Politecnico Di Milano, Piazza Leonardo da Vinci, 32, 20133 Milano, Italy

[2] Department of Architecture (DIARC), University of Naples Federico II, Naples, Italy