4 MILANESE AIRPORT SYSTEM INTERCONNECTIONS: MALPENSA, LINATE AND ORIO AL SERIO

4.1 THE KEY ISSUES ADDRESSED BY THIS CASE STUDY

Milan is the main industrial and trade centre in Italy, with many multinationals' headquarters located in its suburbs and with strong local industrial and service platforms, too. This condition creates a basis for strong inbound and outbound traffic that is exacerbated by two other significant aspects: a strong fashion district located in Milan downtown (Milan is considered the world's capital of ready to wear fashions) and a buoyant convention business that has recently reinforced its own visibility in the international market thanks to additional available exhibition spaces. In addition, a strong outgoing leisure demand, typically concentrated during Christmas and Easter periods and in July-August, originates from Milan's primary catchment area that hosts more than 5 million inhabitants. In 2015 Milan will host the universal exhibition EXPO2015.

The present case study focuses on the analysis and assessment of the interconnections and the accessibility of the three airports closest to the city of Milan. The former-quasi-hub of **Malpensa**, the city airport of **Linate** and the low-cost airport of **Orio al Serio** are all located within a radius of 60 km around Milan and at the centre of the densely populated Lombardy region (Figure 4-1).

Figure 4-1 Location of Malpensa, Linate and Orio al Serio airports

Following the trends all around Europe, the passenger traffic at these airports (with the exception of Malpensa) has been growing during recent years, and this is especially true for Orio al Serio, which has become the main hub of Ryanair in Italy and climbed to the fourth position of Italy's busiest airports last year.

All the three airports operate both national and international flights, but Malpensa and Orio al Serio traffic is mostly international, whereas Linate is predominantly oriented towards domestic flights.

4.2 GENERAL DESCRIPTION OF THE CASE STUDY

4.2.1 Milanese Airports Development

Malpensa airport

Malpensa airport is the biggest airport in the Lombardy region. It is located 50 km northwest of the city of Milan, in the territory of the Province of Varese.

The original airport was built between 1958 and 1962 but the current configuration of Malpensa dates back to 1998, when the new Terminal 1 was opened and the existing international airport was developed into a modern hub and upgraded with increased runway capacity, a brand new passenger terminal, a new control tower, new aircraft parking areas (apron), and a new cargo centre.

Malpensa's upgrade was kicked off in the early 1980s. In 1993 the Christophensen Group included Malpensa 2000 in the TEN-T priority list, making it a primary gateway to southern Europe. In December 1994 the European Investment Bank granted a 15-years loan of some € 200M on the assumption that all national and international flights would switch from Linate to Malpensa, except the Milan-Rome shuttle. Subsequently, the EIB granted further loan for a total final amount of € 307M.

The official inauguration of the new Malpensa 2000 came on October 25th 1998, when only two-thirds of the infrastructure was built.

Investment to guarantee surface accessibility to the airport, which was fundamental for the project performance, was neither part of the Malpensa 2000 project nor managed by the concessionaire. Infrastructures were financed later, by dedicated regional and national laws and plans, and completed not earlier than 2008.

In the new airport, Terminal 1 is divided into three sections:

- 1A that handles domestic and intra-Schengen flights
- 1B handles non-Schengen flights
- 1C is currently closed for refurbishment (flight to U.S.A. and Israel)

Terminal 2, basically constituted by the old passenger's terminal, handles low-cost carriers and charter services.

Table 4-1 Main features of Malpensa airport

Main features
2 terminals
2 runways 3.920 m long
115 stands (of which 31 loading bridges)
256 check-in desks and 83 gates
70 movements per hour

Linate airport

Linate airport is a business airport *par excellence*, within extremely convenient reach of the city of Milan. Situated just on the outskirts of the city (9 km southeast of Milan), it is only fifteen minutes away from the centre of town. The airport buildings are located in the Segrate Municipality, and the field is located mostly in the Peschiera Borromeo Municipality.

Built in the 1930s, at the same time as the Idroscalo (an artificial lake originally dug for seaplanes), Linate "Enrico Forlanini" airport was Milan's main airport up until the 1990s, when the new Malpensa hub came into operation. After a few years in which it was reserved exclusively for domestic flights, Linate then resumed operations on European routes, with a continuous increase in the number of passengers served; the airport is also used by low-cost carriers.

Table 4-2 Main features of Linate airport

Main features
1 terminal 75.000 m^2
1 runway 2.440 m long (+ 1 runway 620 m long scarcely used for general aviation)
35 stands (of which 5 loading bridges)
74 check-in desks and 24 gates
32 movements per hour, limited to 18 movements per hour (see below)
15 Mio pass per year, limited to 10 Mio pass per year (see below)

Orio al Serio airport

In addition to Linate and Malpensa, another airport has assumed a growing role in the Milanese airport system. Orio al Serio airport lies 45 kilometres from Milan and 5 kilometres from Bergamo, in a geographically central position with respect to Lombardy.

Originally used for military purposes, Orio al Serio was admitted to operate civil flights in 1972. It played a minor role for decades and its main traffic has consisted for years of diverted movements from Linate in case of poor visibility, some summer charter flights to provide additional unplanned capacity and eventually courier flights (even now Orio is one of Italy's major cargo terminals).

During the 1980s the airport was improved by widening of the apron space, increasing runway length and by a more comfortable passenger terminal.

Even though at first the opening of a third airport closest to Milan was seen as an obstacle to the development of Linate (the presence of new additional flight routes from/to Orio al Serio posed some operative limitations to Linate), the deregulation and liberalisation subsequent to the coming into force of the unique European market, awakened the interest of foreign airlines, and Swissair and British Airways started operating from Orio.

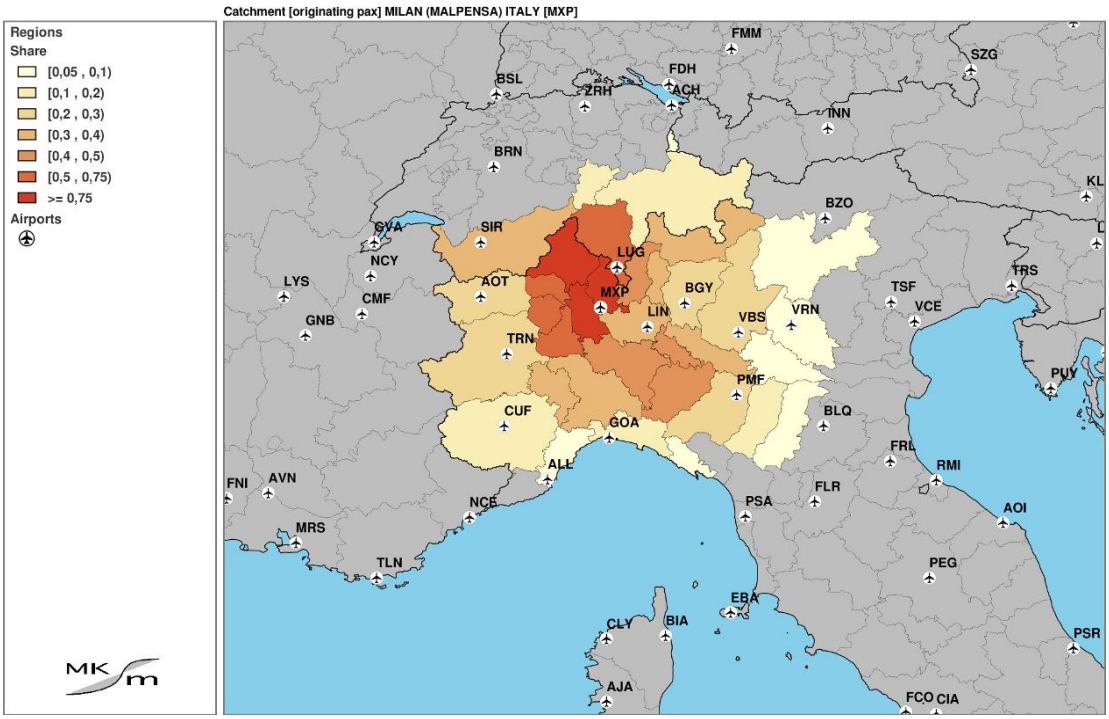
Since 2002, Orio al Serio has become the operating terminal for some major European low-cost airlines – and especially Ryanair. The focus on this cluster of industry was not, however, a consequence of a clear and structured marketing positioning by SACBO, Orio's airport authority, but rather a naive and product-driven approach. Low-cost operators were looking at chances to inaugurate flights to Milan and Orio simply proved to be ideal for a range of reasons: absence of any congestion, proximity to a major motorway, and fast terminal operations. These features favoured the development of intense passenger traffic with northern Europe.

Table 4-3 Main features of Orio al Serio airport

Main features
1 terminal
1 runway 3.024 m long
23 stands (of which 2 loading bridges)
47 check-in desks and 14 gates
24 movements per hour
6 Mio pass per year of capacity

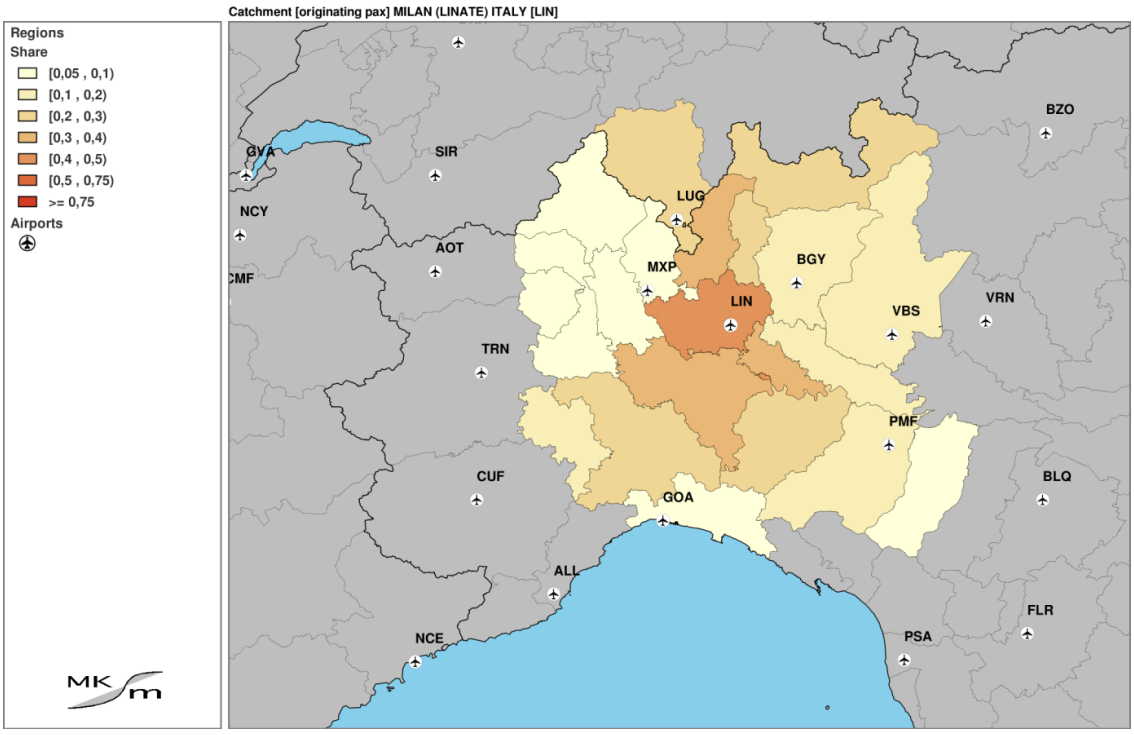
4.2.2 Geographic Coverage

The maps below show the catchment areas of the three Milanese airports. The region shares on the left of the pictures show the percentage of air passengers originating from that region that choose the airport as departure point of their trip.



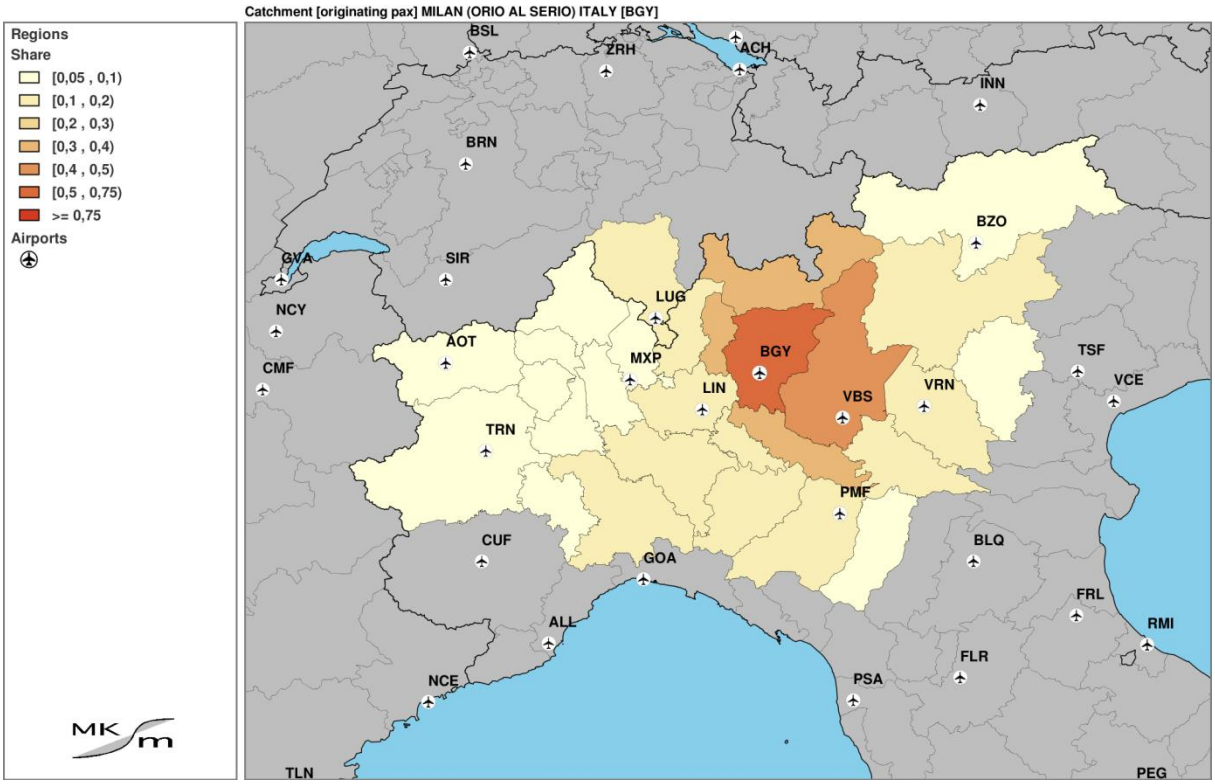
(source: MKm elaborations by VIA)

Figure 4-2 Malpensa catchment area



(source: MKm elaborations by VIA)

Figure 4-3 Linate catchment area



(source: MKm elaborations by VIA)

Figure 4-4 Orio al Serio catchment area

Both Malpensa and Orio al Serio have a larger catchment area in comparison with Linate. It is interesting to note the supremacy of Malpensa for passengers originated by Novara, Varese and Verbano-Cusio-Ossola provinces, and its big share for some southern Swiss regions.

Malpensa and Linate airport seem to be in strong competition for passengers departing from Milan province, while Orio al Serio seems to compete in a very slight way with the other two airports.

4.2.3 Airport Traffic

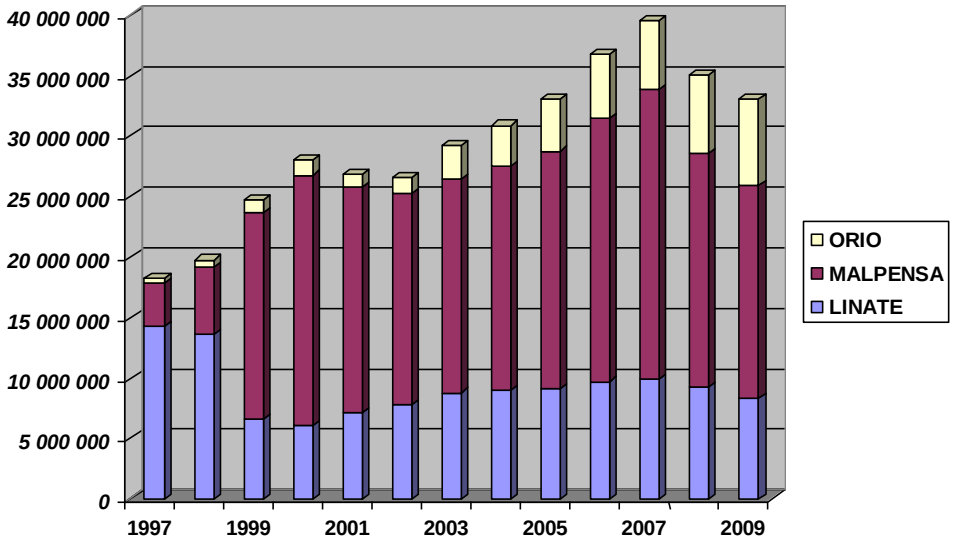
Table 4-4 reports total passenger traffic of the three airports since 1997 and Figure 4-5 displays the cumulative passenger traffic of the Milanese airport system.

Both the table and figure describe some interesting aspects in the development of the current system. As it can be seen, until the opening of the new “Malpensa 2000” terminal in 1998, Linate airport was the fulcrum of the whole airport system, with about 14 million passengers per year. The opening of the new terminal and the consequent regulatory framework, described in the next section, drastically reduced the role of Linate in favour of Malpensa. However, after the transfer of flights from Linate, Malpensa was unable to grow significantly and its traffic remained stagnant for years, with some significant growth only in the years 2006 – 2007.

Table 4-4 Milanese airport system traffic: Passengers

Year	Linate	Malpensa	Orio al Serio	Total Milanese System
1997	14,291,578	3,487,322	478,848	18,257,748
1998	13,631,878	5,533,129	581,060	19,746,067
1999	6,629,639	16,967,088	1,116,762	24,713,489
2000	6,026,342	20,716,815	1,237,445	27,980,602
2001	7,136,337	18,570,494	1,056,876	26,763,707
2002	7,815,316	17,441,250	1,248,912	26,505,478
2003	8,757,038	17,621,585	2,840,481	29,219,104
2004	8,947,525	18,554,874	3,334,182	30,836,581
2005	9,088,607	19,630,514	4,352,134	33,071,255
2006	9,696,515	21,767,267	5,240,816	36,704,598
2007	9,926,530	23,885,391	5,737,092	39,549,013
2008	9,266,152	19,221,632	6,478,716	34,966,500
2009	8,295,099	17,551,635	7,157,421	33,004,155

(source: Assaeroporti statistics)



(source: TRT elaboration on Assaeroporti statistics)

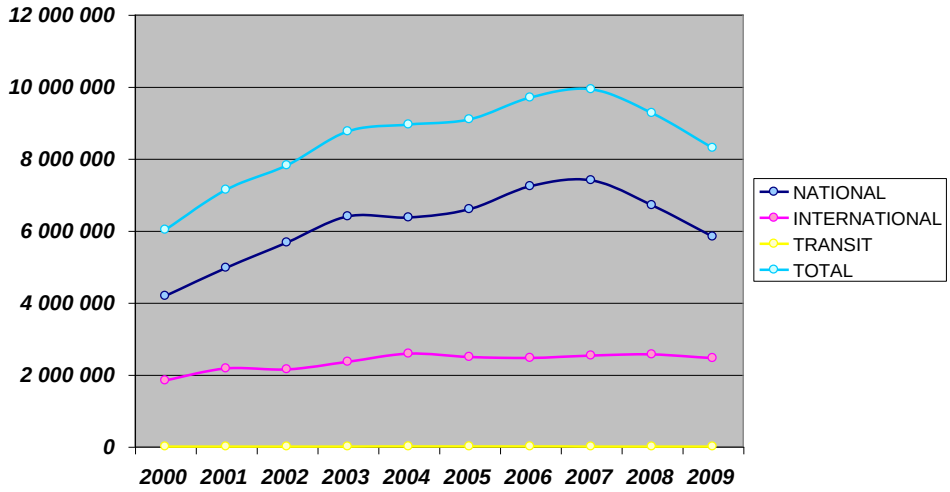
Figure 4-5 Milanese airport system traffic: Passengers

Data also shows that the contribution of Orio al Serio to the airport system was limited until after 2000. Its development partially started in 1998 when the imposed regulatory framework established the moving of flights from Linate to Malpensa: given the poor accessibility of Malpensa due to delays in the completion of land connections some airlines, such as AirOne and Meridiana, preferred to move to Orio al Serio rather than to Malpensa. Table 4-4 shows in fact a doubling of passengers at Orio from 1998 to 1999. Since 2003, when Orio became the hub of low-cost carriers, its importance in the airport system has grown.

Total traffic in the whole system shows an increasing trend until 2007 (apart from the small decreasing trend subsequent to 11th September 2001) but, in the latest two years, a decreasing trend appears for both Linate and Malpensa airports. This can be explained by the overlapping of two different phenomena: the crisis of the Italian national carrier Alitalia (described in the next section) that since 2008 reduced its activity on those airports, and the economic crisis that affected the whole world.

As already stated, all the three airports operate both national and international flights, but Malpensa and Orio al Serio traffic is mostly international, whereas Linate airport is predominantly oriented towards domestic flights. Figure 4-6, Figure 4-7 and Figure 4-8 display the evolution since 2000 of the different market shares respectively for Linate, Malpensa and Orio al Serio. Tables in Appendix 1 provide detailed figures for these trends.

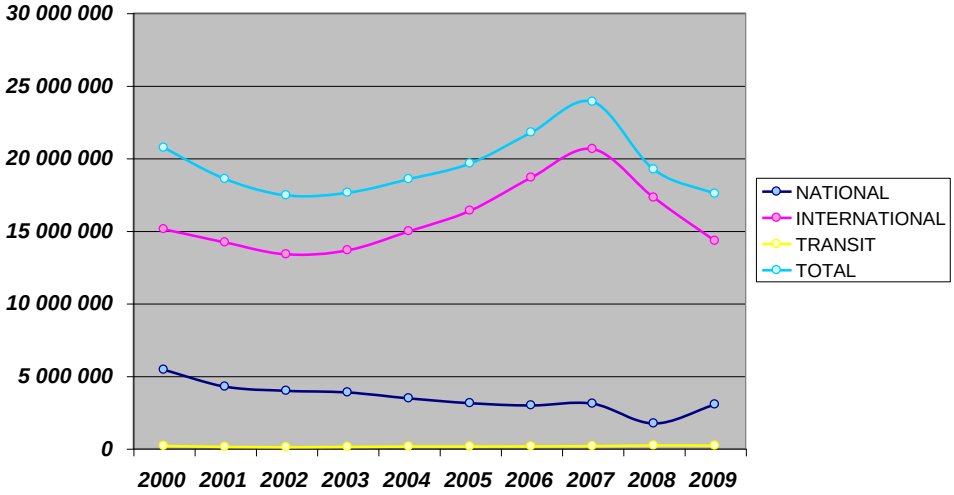
LINATE



(source: TRT elaboration on Assaeroporti statistics)

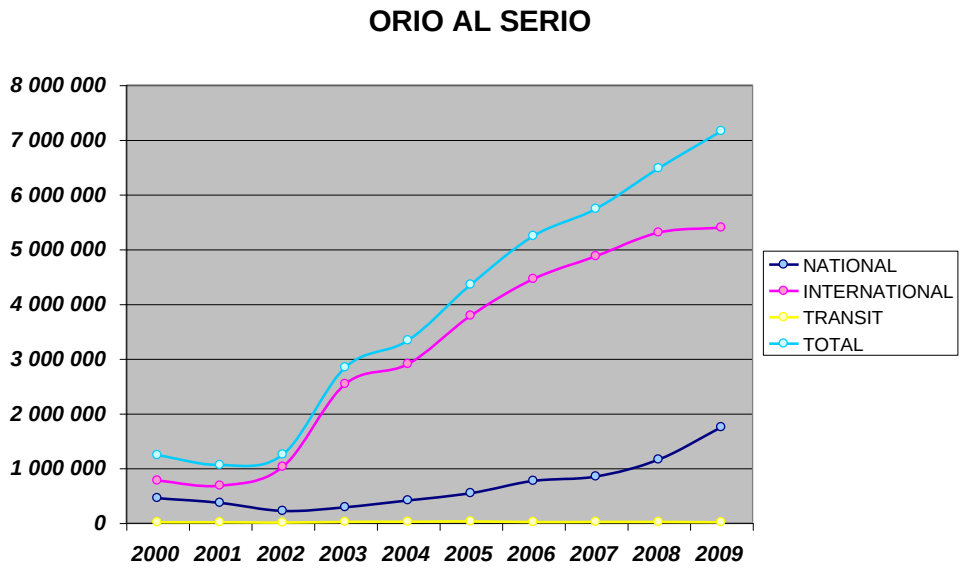
Figure 4-6 Linate airport traffic: Passengers

MALPENSA



(source: TRT elaboration on Assaeroporti statistics)

Figure 4-7 Malpensa airport traffic : Passengers



(source: TRT elaboration on Assaeroporti statistics)

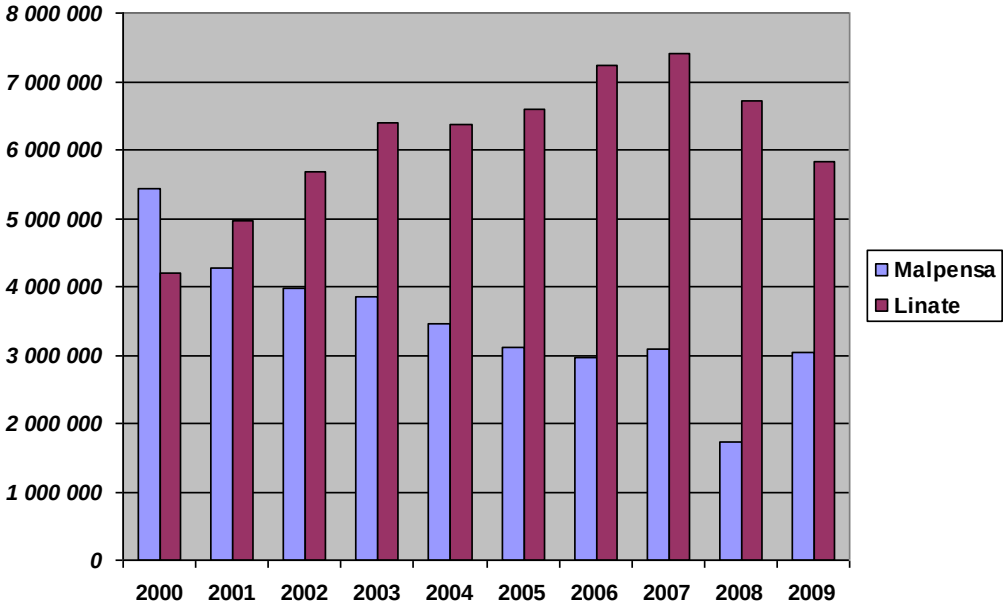
Figure 4-8 Orio al Serio airport traffic: Passengers

Figure 4-7 shows that national traffic from Malpensa airport almost halved from 2000 on. This decreasing trend can be explained if considering the trend of total national passengers for both Linate and Malpensa airports: the sum of national passengers for those airports remained almost stable from 2000 to 2007 and the decreasing trend of Malpensa corresponds to the increasing trend of Linate (see Figure 4-9). This is a consequence of the process of regulation of the activity of the Milanese airport system that, since 1998, had a controversial history.

Table 4-5 Passengers on national flights at Linate and Malpensa

Year	Linate	Malpensa	Linate + Malpensa
2000	4,187,291	5,431,430	9,618,721
2001	4,966,987	4,259,899	9,226,886
2002	5,671,183	3,971,499	9,642,682
2003	6,397,777	3,863,005	10,260,782
2004	6,363,608	3,457,778	9,821,386
2005	6,594,694	3,121,155	9,715,849
2006	7,232,441	2,966,739	10,199,180
2007	7,395,635	3,089,280	10,484,915
2008	6,706,339	3,080,360	8,434,990
2009	5,833,593	3,037,904	8,871,497

(source: Assaeroporti statistics)



(source: TRT elaboration on Assaeroporti statistics)

Figure 4-9 Passengers on national flights at Linate and Malpensa

4.2.4 Airport Regulation

Until 1998 the role of each airport in the Milanese transport system was clear: Malpensa was the terminal for intercontinental flights, whilst Linate hosted most of the national and European traffic; Orio al Serio, of modest size, hosted mostly national and charter flights. The capacity of the whole Milanese airport system was distributed in an inefficient way, since Linate airport was overused whilst Malpensa and Orio were widely underused.

When the Malpensa 2000 project became reality, politicians and technicians started to think how to create a critical mass for a primary hub on Malpensa. On the one hand the limitation of Linate airport activity, the closest airport to Milan, was seen as a fundamental step to promote the development of Malpensa and, on the other hand, to limit Linate and Malpensa cross-cannibalisation.

Two initial governmental decrees[5], named "Burlando Decrees"[6], imposed that since 25th October 1998 all flights from and to Milan would have been operated from Malpensa or Orio al Serio, except those routes that in the previous year exceeded 2 million passengers or in the latest three years reached an average traffic of more than 1.75 million passengers. In fact these thresholds limited Linate activity in operating only Milan-Rome flights.

Many carriers complained, however, that this would favour Alitalia. In fact, the main objective of the policy was to ensure an adequate demand for the new infrastructure by allowing Alitalia to set up hub operations at the new airport without replicating services and excluding competitors, mainly foreign flag-carriers, in the connecting traffic.

On 16th September 1998, the European Commission supported the complaining airlines' case and stated that Italian authorities could not adopt this regulation.

As a consequence, the Italian Transport Ministry promulgated a new decree[7] that imposed the partial moving of some flights from Linate to Malpensa, allowing the airlines to operate only 34% of the frequencies of the previous year, with a guaranteed minimum limit of 18 weekly frequencies. This decree, which entered in force on 15th January 2000, made the switching conditions less strict and numerous national and EU services moved back to the city airport or were duplicated.

[5] n°46-T (5th July 1996), n°70-T (13th October 1997)
[6] Burlando is the surname of the ruling Minister for Transportation at that time.
[7] n°101-T (9th October 1998)

A number of other decrees were then promulgated and each time Malpensa was losing flights that were coming back to Linate. The last one, known as "Bersani Bis Decree"[8], which came into action in 2001 and is still in practice, establishes the role of city airport for Linate and that all-intra European point to point connections with states' capitals can be operated from Linate, although with limitations in both frequency and capacity.

This decree, even though it increased Linate's capacity from the former 13 movements per hour to the current 18 with a potential increase from 230 to 300 flights per day, still poses strong reduction to Linate's activity given its theoretical capacity of about 32 movements per hour.

Traffic data and the list of unsatisfied requests of slots show that the limitation set for Linate activity nowadays is not only highly below the technical capacity, but also below airlines' demand.

4.2.5 Alitalia's Crises

Historically, Alitalia did not have a clear hub-and-spoke network but Rome Fiumicino was always the base of its operations. Some intercontinental flights departed from Malpensa, but did not form part of any hub-and-spoke scheme involving feeder routes and timetable co-ordination. The few possible connecting flights mainly involved national and intercontinental destinations.

The original decision to expand Malpensa was taken regardless of Alitalia's future, but later it was seen as an opportunity to strengthen the carrier's position and to regain long haul, connecting traffic.

Alitalia had never, in the early 1990s, planned to set its hub at Malpensa: in fact the first public statement is found in the 1998–2001 Industrial Plan (Giannelli, 2003), more than ten years after the approval of the airport Master Plan.

In the competitive environment after 1997, Alitalia tried to reorganise its network along the lines of other European carriers by focusing on hub-and-spoke services. The strategy chosen by the airline in 1998, after the opening of the new airport, can be summarised as follow:

- to have its main hub at Milan Malpensa for EU and intercontinental flights, fed by short haul routes;
- to fully integrate services at Amsterdam Schiphol with its then partner KLM;
- to have a secondary hub for national, north–south connections at Rome Fiumicino, including some intercontinental flights for leisure and business markets;
- to drop all routes from Milan Linate, apart from the Milan–Rome shuttle.

Within a few years, KLM broke its alliance with Alitalia, largely for political reasons. One of the pillars of the alliance was the hub at Malpensa, but its role was reduced by the switch-back to Linate undermining the overall merger plan. The resulting Alitalia network configuration was a bi-hub system based on Milan Malpensa and Rome Fiumicino, with many duplicated routes. The result is that the full benefit of the economies of scale associated with hub-and-spoke operations was not realised.

The situation worsened rapidly: in 2007 Alitalia's financial problems became evident and the viability of the carrier came into question. Competition between airlines, together with its high costs and its organisation across three airports (Linate, Malpensa and Rome Fiumicino) eventually lead Alitalia to bankruptcy.

The new Alitalia's Industrial Plan 2008–2010 was focused on stopping hub operations and focusing on a point-to-point business network at Malpensa with only three intercontinental routes being retained, moving all feeder routes to Rome, the abandonment of unprofitable intercontinental routes from both airports, and the reduction of the short haul fleet.

[8] See note 2.

After Alitalia's de-hubbing on March 2008, Malpensa airport experienced a period of crisis that overlapped the world financial crisis. The situation was immediately faced by the new commercial strategy promoted by SEA and the new alliances with Lufthansa and EasyJet carriers. In 2009, 17 new airlines established in Malpensa providing 420 additional weekly flights.

Today the airport has 160 destinations against the 166 available before the de-hubbing and, even though the recent Iceland volcano ash cloud (April 2010) does not allow reliable statistics, new positive trends are being registered for 2010.

4.2.6 Traffic Forecasts

Recent forecasts for passengers traffic at 2030 have been made available in a recent study on the Italian airport system promoted by the Ministry of Transport[9].

Year	Linate	Malpensa	Orio al Serio
2030	9,000,000	42,000,000	12,000,000

Figure 4-10 Milanese airports traffic forecasts

This study is a preparatory document for the future national plan on airports activity, whose purpose is the reorganisation of the national airport system.

Nowadays the Italian airport system is characterised by 100 airports located throughout the national territory, of which 47 are opened to civil aviation with scheduled flights. Among these, eight airports operate more than 70% of total passenger traffic, and this percentage rises to 95% if considering the first 20 airports. Only seven airports have a traffic higher than 5 million passengers per year[10].

It is clear that the current system is too complex, with a high risk of main airports to be cannibalised by the minor ones: a national strategy to co-ordinate airports' activity is therefore needed. The strategy envisaged in the study takes into account the closure or the restructuring of airports with a traffic lower than 1 million passengers per year (24 airports), that could be dedicated to private aviation or to freight transport, and to strengthen the role of 14 airports (generally with more than 5 million passengers per year) considered as strategic for the development of the country.

Malpensa, Linate and Orio al Serio airports are of course included in the list of strategic airports and their role in the national system is confirmed.

4.3 SPECIFIC CHARACTERISTICS OF THE CASE STUDY

4.3.1 Modes and Infrastructure Involved

Malpensa airport

Malpensa: Road connections

Malpensa airport (50 km northwest of the city of Milan) is located along the A8 "Autostrada dei Laghi" motorway, a section of the European E62, which connects Milan to Varese. The secondary level road SS336 connects the A8 exit Busto-Arsizio with the airport. Since the end of March 2008, the new 18.6 km motorway branch Malpensa-Boffalora connects the airport to the A4 Turin-Venice motorway (E64). Table 4-6 reports average journey times, distances and costs to reach the airport by car from each Lombardy province.

[9] "Indagine conoscitiva sul sistema aeroportuale italiano". February 2010.
[10] The study takes into account traffic volumes at 2008.

Table 4-6 Malpensa road accessibility from Lombardy provinces

PROVINCE	TIME (min)	DISTANCE (km)	TOLL (Euro)	FUEL COST (Euro)	TOTAL COST (Euro)
Bergamo	67	91	4,10	7,58	11,68
Brescia	96	137	6,60	10,86	17,46
Como	54	62	1,80	5,31	7,11
Cremona	99	153	7,70	12,76	20,46
Lecco	81	96	1,40	8,21	9,61
Lodi	69	91	4,10	8,22	12,32
Mantova	136	225	11,30	17,22	28,52
Milano	51	50	1,40	4,64	6,04
Monza e della Brianza	50	58	1,40	4,88	6,28
Pavia	66	86	4,30	7,70	12,00
Sondrio	153	174	1,40	15,11	16,51
Varese	37	40	1,20	3,42	4,62

(source: TRT elaborations by viamichelin)

Malpensa: Parking facilities

Malpensa airport has five different parking areas, differentiated for type, capacities and fares. Parking fares are differentiated according to the duration of parking time. More convenient fares are available for parking time longer than a day and for week-end. Detailed information on parking fares are provided in Appendix 1. Parking lots can also be booked via the Internet.

Other private parking areas are also available outside the airport. Generally they are connected to the terminal by free bus shuttle 24 hours and offer advantageous fares for long parking times.

Malpensa: Bus services

Two different companies operate “Malpensa Bus Express” and “Malpensa Shuttle” bus services connecting the airport to Milano Centrale railway station. Their cumulative scheduling allows a bus departure each 10 minutes.

The first run from Milan to Malpensa is at 04.15 and the last one at 00.30.

The first run from Malpensa to Milan is at 05.30 and the last one 01.20.

Table 4-7 Main features of Malpensa bus connections to Milan

BUS STOP	JOURNEY TIME* (min)	FREQUENCY (min)	FARES (Euro)
Milano Centrale	0	10	**Single ticket:** Adult € 7.50; child € 3.75 **Multi-ride ticket:** Valid for three rides: € 15
Milano City Exhibition Centre	15		
Malpensa T2	45		
Malpensa T1	50		

* During off-peak hours.

From Malpensa bus services connecting the airport to other cities are also available. Table 4-8 summarises the main features of these connections.

Table 4-8 Malpensa bus connections to other cities

DEPARTURE CITY	INTERMEDIATE STOPS	TIME (min)	DISTANCE (km)	Number daily services (from/to)	FARES (€)
Turin		120	139	20	18
Lugano	Mendrisio	70	83	30	23
Bellinzona	Lugano, Chiasso	105	59	15	23
Genova*	Alessandria	180	186	4	22
Novara	Bellinzago, Oleggio	50	52	16	7
Lago Maggiore Verbania*	Feriolo, Solcio	80	63	12	11.5
Domodossola*	-	80	90	10	10.5
Brescia	Bergamo	150	140	6	39
Bergamo	-	90	90	6	25
Como	Varese	120	65	6	25
Varese	-	60	40	6	18

* Service available only if booked in advance.

Malpensa: Taxi service

The price of taxi rides to Malpensa airport is fixed by specific contracts. Table 4-9 reports the current fares.

Table 4-9 Malpensa taxi connections fares

	FARES (Euro)
Malpensa - Milan (all streets) or vice versa	85
Malpensa - Milan (Rho) Exhibition Centre or vice versa	60
Malpensa – Linate airport or vice versa	95
Malpensa - Varese (all streets) or vice versa	60

Malpensa: Rail connections

Malpensa Terminal 1 is connected to Milano by Malpensa Express train service. Malpensa Express is not operated by Trenitalia (the main Italian rail company) but by LeNord, a regional operator[11]. Until January 2010 the service was operated twice per hour, always with intermediate stops at Milano Bovisa, and Saronno and, for some trips, also Busto Arsizio, and took about 40 minutes.

Since January 2010, after completing capacity improvement works on the rail tracks (new Castellanza station) Malpensa Express service provides 21 point-to-point trips and 55 with intermediate stops trips; trains depart every 30 minutes and the journey from Cadorna Station to Malpensa lasts 29 (point to point) or 36 minutes (with intermediate stops).

The service, organised with regular interval timetabling, is effective from 04:30 to 01:30, but the last three trips of the day are operated by bus and do not stop in any intermediate station (50 minutes).

Table 4-10 reports the main feature of the rail service.

[11] Trenitalia and LeNord merged in August 2009. Nevertheless, a real integration is still far to be achieved.

Table 4-10 Milano Cadorna- Malpensa rail service main features

STATIONS	JOURNEY TIME (min)		FREQUENCY (min)	FARES (€)
Milano Cadorna	0	0	30	**Single ticket:** Adult € 11; child € 5.5 **Daily return ticket:** Adult € 14.50; child € 7.5 **Multi-ride ticket:** Valid for six rides: € 55
Milano Bovisa	5	-		
Saronno	19	-		
Busto Arsizio	28	-		
Malpensa T1	36	29		

(source: http://www.malpensaexpress.it)

Malpensa: Connection between terminals

At Malpensa airport a free shuttle bus is available every 15 minutes for 24 hours a day, to connect the Malpensa Express railway station in Terminal 1 to Terminal 2. Buses run along secondary roads that are also accessible to private transport and make also intermediate stops in correspondence of parking areas of rental car companies. The promiscuity between shuttles and private transport sometimes causes delays because of unregulated parking of private vehicles in proximity of the main stops.

Linate airport

Linate: Road connections

Linate is Milan's "city airport" and, because of its proximity to the city borders and to the orbital motorway A51 (see Figure 4-11), it is the favourite choice of citizens who have the possibility to choose between Malpensa and Linate flights.

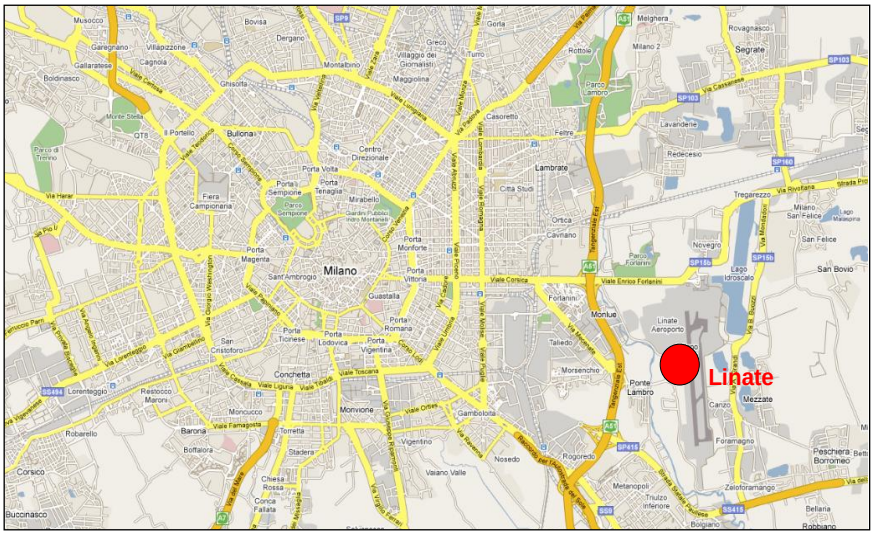


Figure 4-11 Linate road accessibility

Table 4-11 reports average journey times, distances and costs to reach the airport by car from each Lombardy province.

Table 4-11 Linate road accessibility from Lombardy provinces

PROVINCE	TIME (min)	DISTANCE (km)	TOLL (Euro)	FUEL COST (Euro)	TOTAL COST (Euro)
Bergamo	40	50	3.10	4.31	7.41
Brescia	69	96	5.60	7.93	13.53
Como	60	69	4.80	5.86	10.66
Cremona	62	99	5.40	7.93	13.33
Lecco	55	59	1.60	5.37	6.97
Lodi	32	37	1.80	3.39	5.19
Mantova	116	160	5.40	12.41	17.81
Milano	21	9	0.00	1.19	1.19
Monza e della Brianza	22	18	1.60	1.81	3.41
Pavia	45	54	2.00	5.09	7.09
Sondrio	127	137	1.60	12.27	13.87
Varese	61	76	4.20	6.14	10.34

(source: TRT elaborations by viamichelin)

Linate: Parking facilities

Linate airport has two different parking areas, differentiated for type, capacities and fares. A third parking area for 2600 lots is under construction. Parking fares are differentiated according to the duration of parking time. More convenient fares are available for parking time longer than a day and for the weekend. Details on parking fares are provided in Appendix 1.

Parking lots can also be booked by via the internet.

Other private parking areas are also available outside the airport. Generally they are connected to the terminal by free bus shuttle 24 hours and offer advantageous fares for long parking times.

Linate: Bus services

Linate airport is connected to Milan city by the bus services operated by ATM (the urban public transport operator), STARFLY and by ATM-AIR PULLMAN

ATM Line 73 connects Milan San Babila Square (a stop of metro Line 1) with the terminal in about 45 minutes and 8 intermediate stops. The service runs from 05:30 to 01:00 with an average frequency of 10 minutes.

Since December 2009 a new Line X73, express line with no intermediate stops (and with a different route) between Linate and San Babila, also operates from Monday to Friday and connects the airport in 25 minutes (but travel time is highly irregular due to traffic jam, since the bus does not always travel on reserved lanes). The service is effective from 07:00 to 20:00 with a frequency of 20 minutes.

The trip fare is the same for all urban public transport: € 1 for a 75 minutes ride plus an additional Euro for each piece of luggage.

It should be noticed that the buses operating these services are normal urban buses and are not equipped with specific spaces for luggage.

STARFLY lines connect Milano Centrale railway station with Linate in about 37 minutes. They stop also in Milano Lambrate railway station. The service runs from 05:40 to 23:30 with a frequency of 20 minutes and a fare of € 5.

Additional services connecting Linate with the two Milanese exhibition centres ("Milano City Exhibition Centre" and "Milano Rho Exhibition Centre") are also provided during the exhibitions from 08.30 to 18.50 with a frequency of one hour. The run takes 35 minutes from Linate to "Milano City" and additional 10 minutes to "Milano Rho"; the fare is € 6.50.

Since 1st July 2010 a new bus connection between Milano Centrale railway station and Linate, with an intermediate stop in Dateo Square, is operated by ATM-AIR PULLMAN. The service frequency is of 30 minutes, the first run is at 06.00 from Milano Centrale and the last is at 23:00. The fare is € 4 and the travel time is 25 minutes.

Linate airport is also connected to Pavia and Brescia with bus services. Table 4-12 summarises the main features of these connections.

Table 4-12 Linate bus connections to other cities

City	Intermediate stops	Distance (km)	Travel time (min)	Number of daily service a/r	Price (Euro)
Pavia	Binasco, Assago	50	46	11	**Single ticket:** Adult: € 13; child: € 10 **Round trip ticket:** Adult: € 23; child: € 18
Brescia	-	100	60	6	€ 35

Linate: Taxi service

Linate airport can be reached by taxi. Generally a ride from Milan city centre to Linate costs about € 20. Fixed fares are available for connections from Milano Rho Exhibition Centre to Linate airport with a price of € 50.

Orio al Serio airport

Orio: Road connections

Orio al Serio is located in Bergamo province along the A4 Milan – Venice motorway (E64) and it is 5 km from Bergamo and 45 km from Milan. Table 4-13 reports average journey times, distances and costs to reach the airport by car from each Lombardy province.

Table 4-13 Orio al Serio road accessibility from Lombardy provinces

PROVINCE	TIME (min)	DISTANCE (km)	TOLL (Euro)	FUEL COST (Euro)	TOTAL COST (Euro)
Bergamo	10	5	0.00	0.70	0.70
Brescia	41	53	2.50	3.19	5.69
Como	73	94	5.90	6.20	12.10
Cremona	62	101	5.10	6.47	11.57
Lecco	57	40	0.00	3.14	3.14
Lodi	63	83	4.90	5.78	10.68
Mantova	79	138	6.80	8.66	15.46
Milano	48	53	3.10	3.86	6.96
Monza e della Brianza	34	42	3.70	2.75	6.45
Pavia	74	99	5.10	7.21	12.31
Sondrio	135	160	3.70	10.90	14.60
Varese	68	98	5.30	6.12	11.42

(source: TRT elaborations by viamichelin)

Orio: Parking facilities

Orio al Serio airport has four different parking areas with about 6,000 parking lots.

For short term parking a space in front of the terminal is available for the following fares:

- € 0.50 first 15 minutes
- € 2.50 each hour
- € 0.50 every 12 minutes or fraction.

Table 4-14 summarises the fares for each parking area. No special rates are available for parking times longer than a day. All passengers travelling on charter flights are entitled to obtain a special parking rate of € 31.50 per 7 days and € 36.00 per 8 days for Sector C parking.

Table 4-14 Orio al Serio parking rates by day

PARK	TYPE	FARES per day (€)
Sector A	sheltered	18
Sector A1	unsheltered	15
Sector B	sheltered	10
Sector C	unsheltered	9

(source: www.sacbo.it)

Other private parking areas are also available outside the airport. Generally they are connected to the terminal by free bus shuttle 24 hours and offer advantageous fares for long parking times.

Orio: Bus services

Orio al Serio airport is easily reachable by bus from Bergamo, Brescia and Milano Central railway stations. Two providers operate the connection with Milano central station; services have different scheduling so the cumulative frequency is very high.

Table 4-15 Orio al Serio bus connections

DEPARTURE CITY	INTERMEDIATE STOPS	TIME (min)	DISTANCE (km)	Number daily services (from/to)	FARES (€)	FIRST TRIP	LAST TRIP
Bergamo		15	5	79	3.5	5:20	24:25
Brescia		60	50	14	10	4:10	22:30
Milan	Milano Lambrate *	60	58	174	8.9	4:00	01:00

Only for 10 trips per day*

Connections between airports

Different operators provide bus services that connect Malpensa (Terminal 1 and 2) and Linate airports in about 1 hour and 10 minutes, though with few runs in a day.

One service (10 daily runs from/to) connects Linate and Malpensa and stops on demand also in Cascina Gobba and Cormano. Another service (6 daily runs) connects Linate and Malpensa airports via Sesto San Giovanni; in this case additional stops in Cologno Monzese and Cinisello Balsamo can be booked in advance. The ticket costs € 13.

Bus connection between Malpensa and Orio al Serio are also available: 12 daily runs connect the Malpensa airports in 1 hour and 10 minutes. Runs start from Bergamo city and have an intermediate stop to Orio al Serio airport. One-way ticket costs € 18; round-trip € 30.

Analysis on access modes

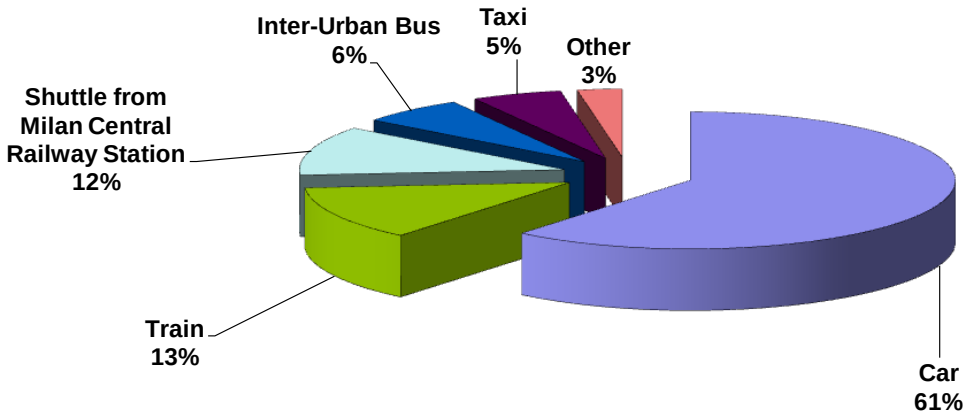
Airports' management companies constantly monitor customer satisfaction on airport facilities by means of surveys. In this context information on transport modes used to access the airports is also collected. Data for 2009 has been kindly made available to TRT for the purposes of the INTERCONNECT project, and its main findings are reported below.

The graphs reported in Figure 4-12, Figure 4-13 and in Figure 4-14 show the share of transport modes used to access respectively Malpensa, Linate and Orio al Serio airports.

As expected, the main access mode is car for all airports: for Malpensa airport the share by car is about 61%, for Linate it decreases to 39% and for Orio al Serio is about 64%.

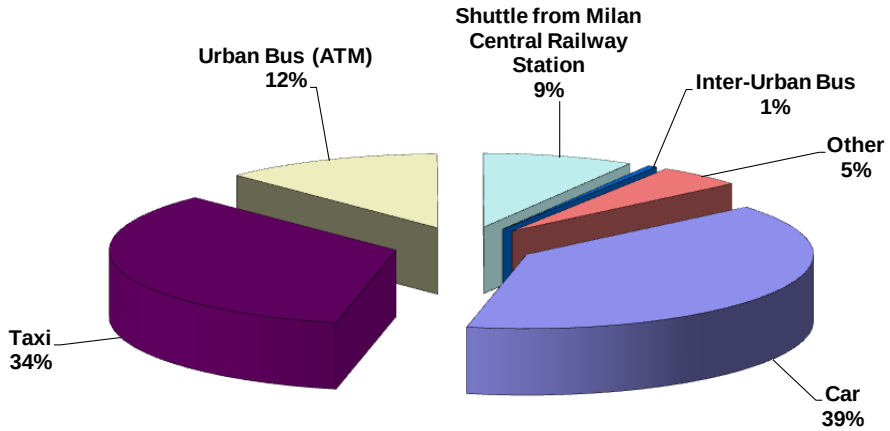
The difference of car modal share for Linate can be easily explained by considering the modal share of taxi that in this case is of about 34%.

Another interesting figure is the high share of shuttle bus from Milan central railway station to reach Orio al Serio (27%) in comparison with the share of shuttle services to reach Malpensa (12%) and Linate (9%).



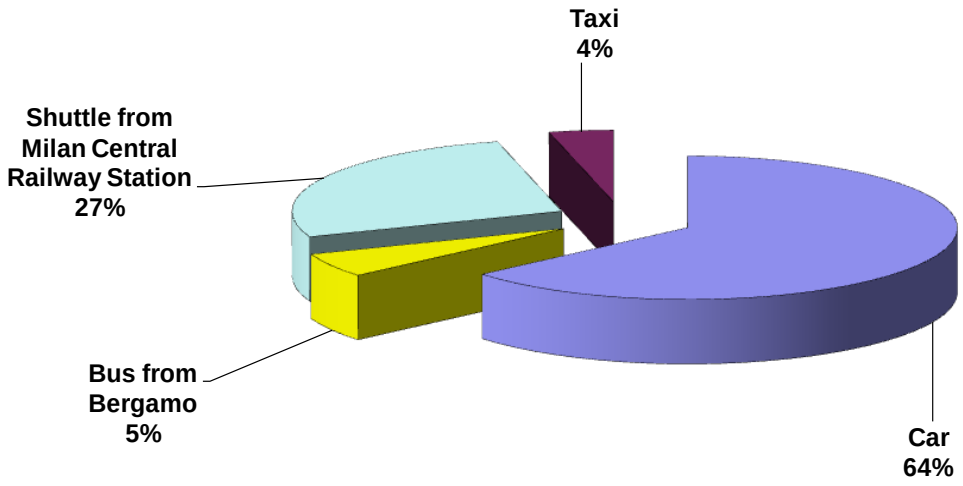
(source: TRT elaboration on SEA surveys)

Figure 4-12 Access modes to Malpensa airport: 2009



(source: TRT elaboration on SEA surveys)

Figure 4-13 Access modes to Linate airport: 2009

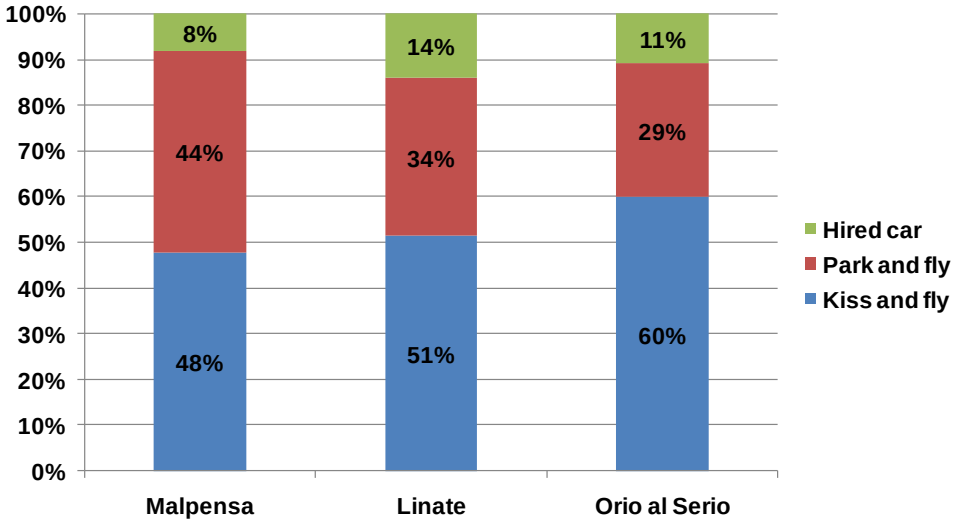


(source: TRT elaboration on SACBO surveys)

Figure 4-14 Access modes to Orio al Serio airport:2009

The graph in Figure 4-15 reports the detailed information on access by car mode, segmented by park-and-fly, kiss-and-fly and hired car options.

It is interesting to notice the high share of the kiss-and-fly option at Orio al Serio airport, that can be explained by considering the different nature of Orio's users. As already mentioned, Orio is the low cost hub for several airlines, and consequently it's reasonable to conclude that its users have a low willingness to pay for parking even if the parking rates at this airport are not so expensive.



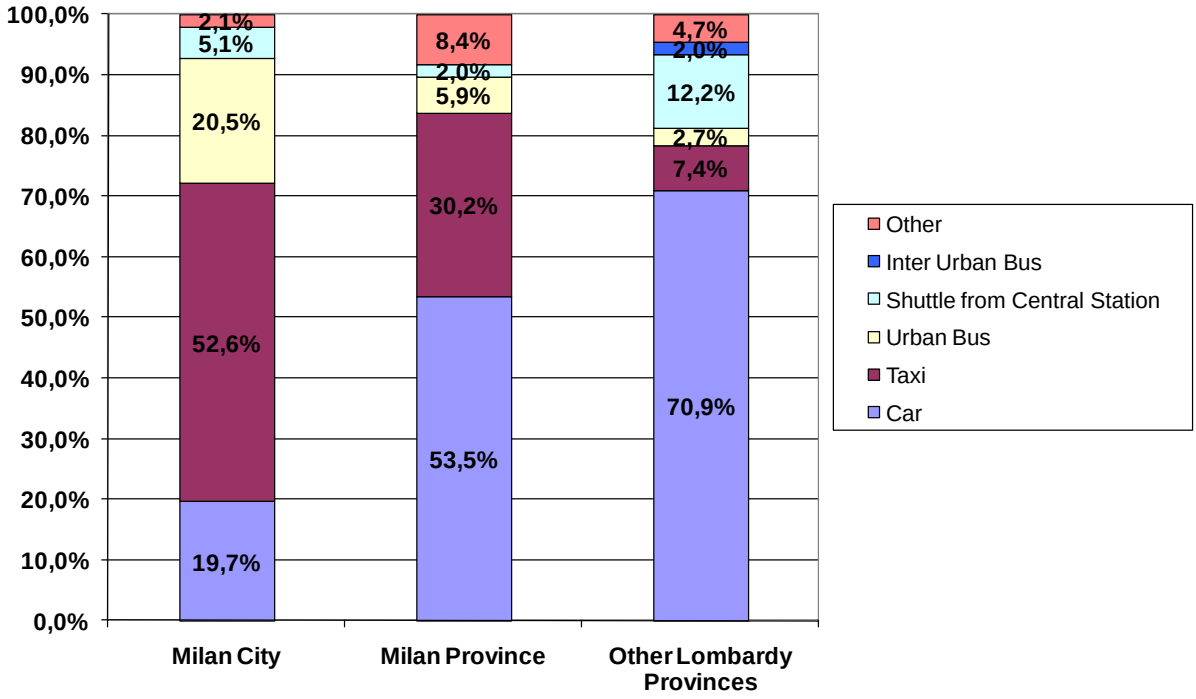
(source: TRT elaboration on SEA and SACBO surveys)

Figure 4-15 Share of park-and-fly, kiss-and-fly and hired car: 2009

The graph in Figure 4-16 details the access modes to Linate airport segmented by the origin zone of Lombardy. It is not surprising to notice the high share of taxi and public transport usage when the origin of the access trip is in Milan City and the corresponding decrease of both these shares when the access trip originates from Milan Province.

The graph also shows the predominance of accessibility to Linate by car from the remaining Lombardy provinces.

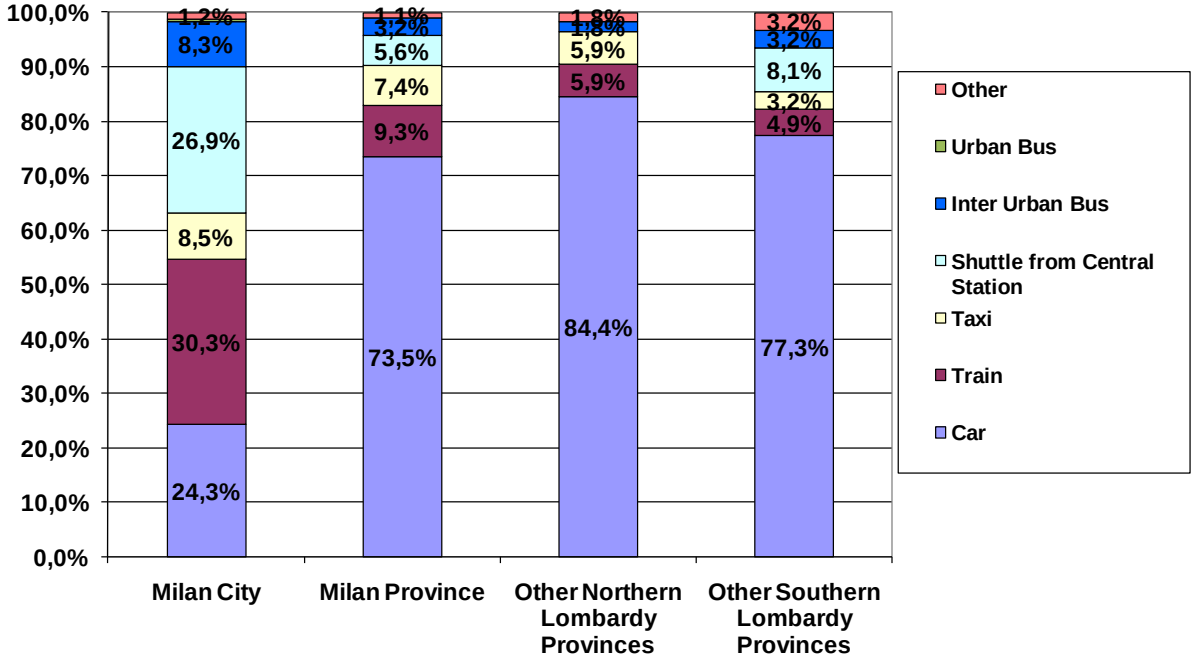
From the Lombardy provinces the usage of bus shuttle from Milan Central station rises to 12%; this evidence clearly shows that in this case the first leg of the access trip is made by train.



(source: TRT elaboration on SEA surveys)

Figure 4-16 Access modes to Linate airport segmented by origin zone:2009

Analogously, the access modes to Malpensa airport detailed by origin zone within Lombardy region are reported in Figure 4-17. It is interesting to notice the low share of car and the high share of accessibility by train and shuttle bus from Milan City. From all the remaining origins, car has the main share.



(source: TRT elaboration on SEA surveys)

Figure 4-17 Access modes to Malpensa airport segmented by origin zone: 2009

Analysis on egress modes

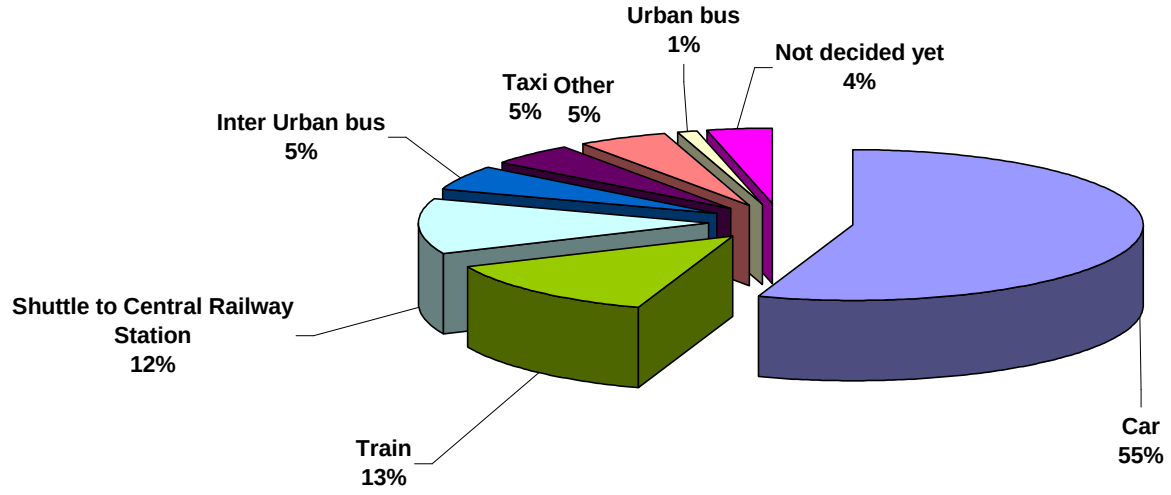
In the context of INTERCONNECT project additional surveys have been made at Malpensa and Linate airports.

The purpose of this analysis was twofold: the first objective was to investigate on egress modes used by passengers landing in these airports; the second was to survey the passenger level of information on interconnection opportunities available at the airports.

In July 2010, 575 passengers in the three terminals of Linate, Malpensa T1 and Malpensa T2 were interviewed immediately after their exit from the plane. The sample was selected by considering only passengers arriving at the airports (and thus Milan is the destination of their outward trip) The purpose of this selection criterion was to collect a sample of travellers that were not residents in the airports' catchment area and thus to analyse the behaviour of people not totally aware of the Milanese transport system. The sample composition resulted in a mix of 60% foreign passengers and 40% Italians.

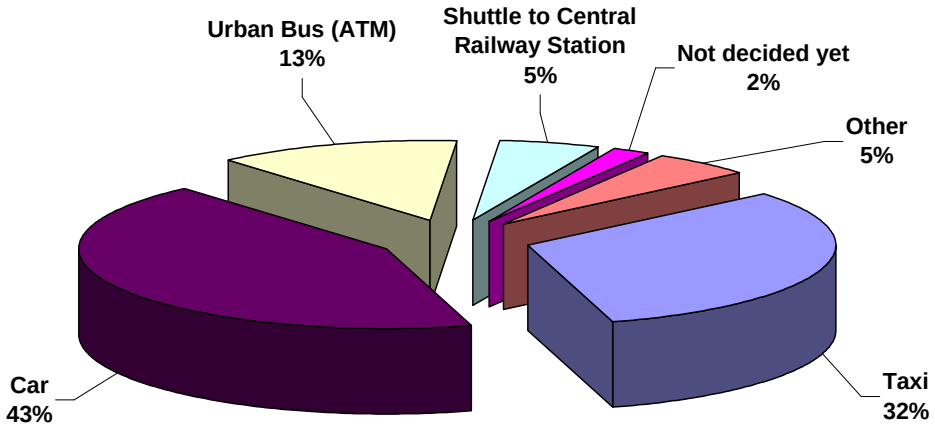
The main outcomes of the survey are presented below.

As mentioned above, passengers were interviewed immediately after they disembarked. It is interesting to note that only a very low share of passengers had not already decided how to egress the airports. Figure 4-18 and Figure 4-19 show the share of egress modes chosen by passengers when leaving respectively Malpensa and Linate airport. Generally, no significant differences can be detected with respect to the access modes. It's worthwhile to clarify that, given the selection of the sample, in this case the *car* mode is mainly related to kiss-and-fly or hired car options. It is remarkable that even excluding return trips, car attracts the relative majority of travellers from the Milan airports. The share is higher for Italian travellers (two thirds of them use car to leave Malpensa) but not dramatically higher.



(source: TRT elaboration on own surveys)

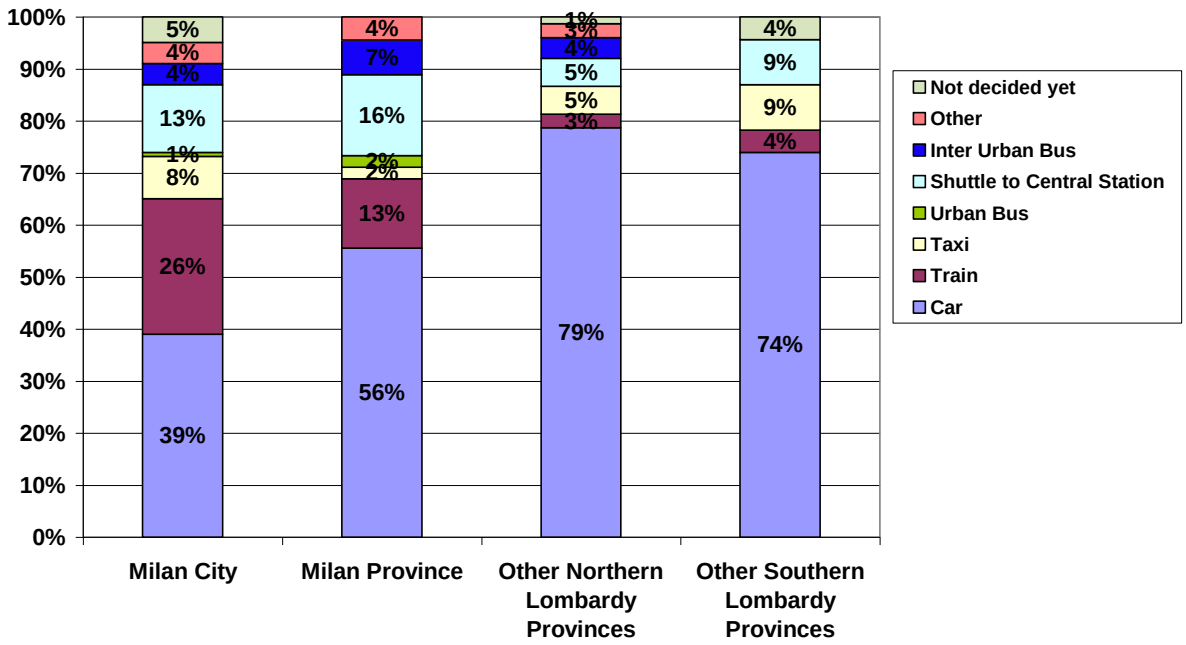
Figure 4-18 Egress modes from Malpensa airport: 2010



(source: TRT elaboration on own surveys)

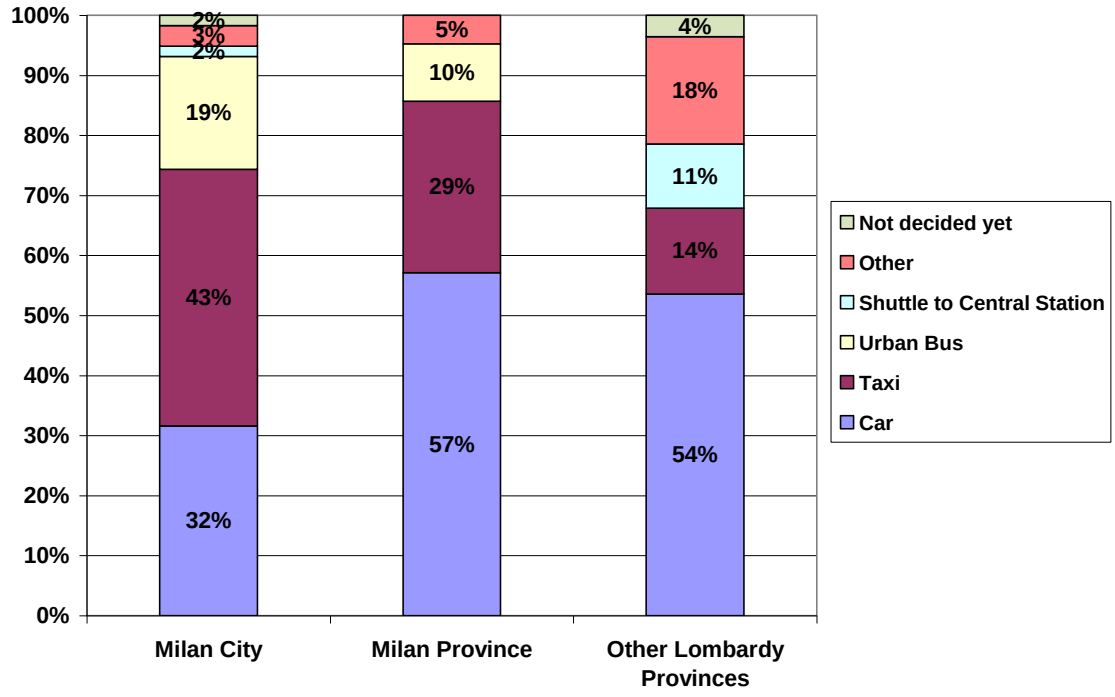
Figure 4-19 Egress modes from Linate airport: 2010

Figure 4-20 and Figure 4-21 illustrate the chosen egress modes segmented by the final destination zone within Lombardy for Malpensa and Linate. Also in this case no particular differences emerge from the comparison with the access modes.



(source: TRT elaboration on own surveys)

Figure 4-20 Egress modes from Malpensa airport by destination zone: 2010

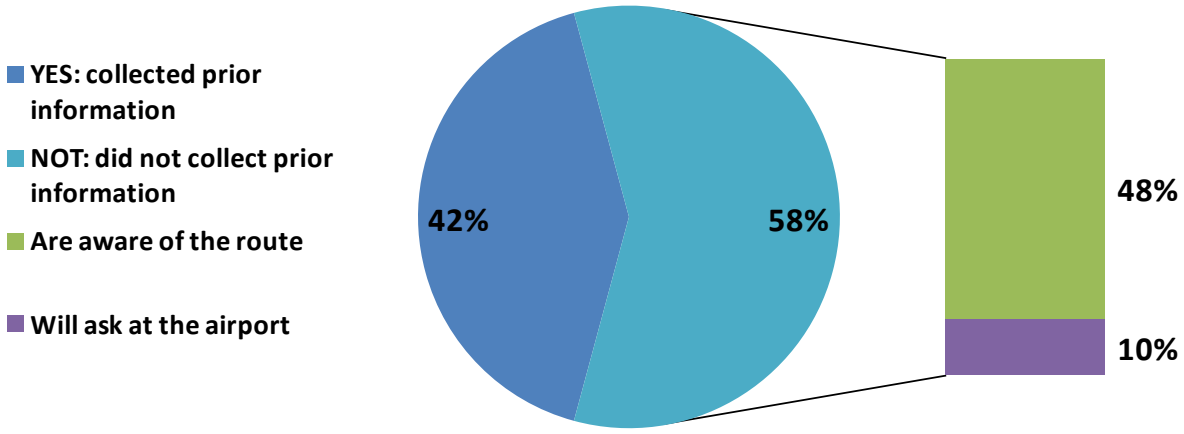


(source: TRT elaboration on own surveys)

Figure 4-21 Egress modes from Linate airport by destination zone: 2010

Analysis on passengers' information

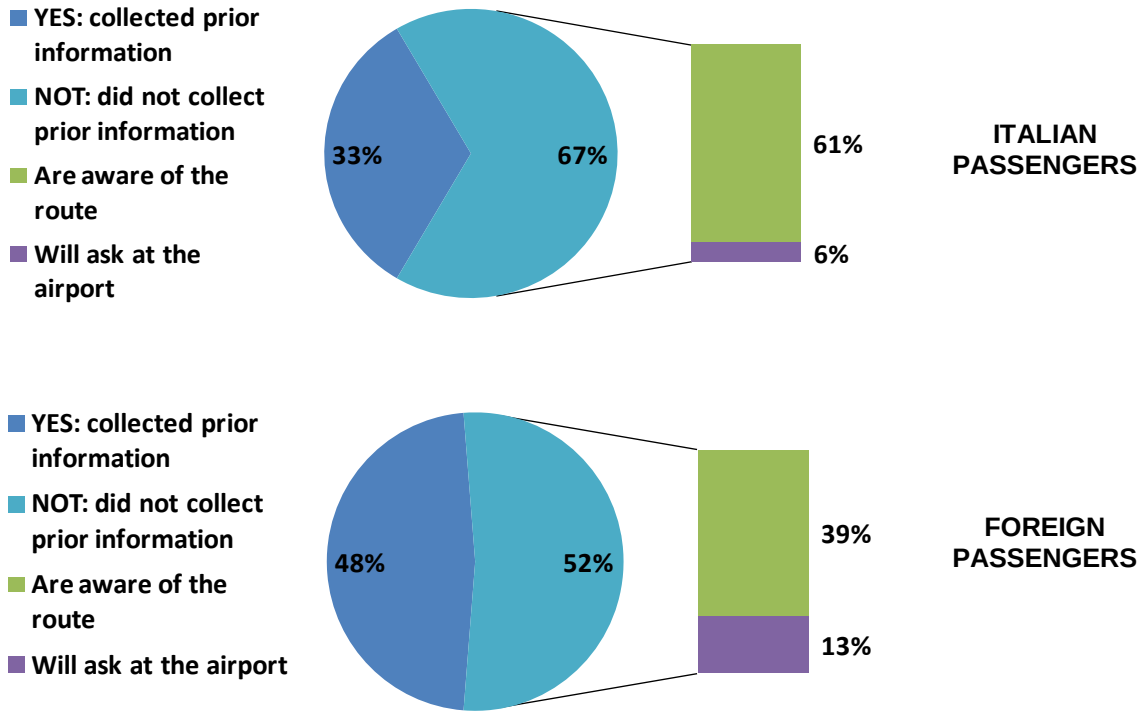
42% of interviewed passengers declared to have collected pre-journey information on how to leave the airport for their final destination. Most of the passengers that did not collect pre-journey information are aware of the route to their final destinations (48%); only 10% landed without any prior information and needed to collect indications at the airport.



(source: TRT elaboration on own surveys)

Figure 4-22 Percentage of travellers that collected pre-journey information on egress mode from airport: 2010

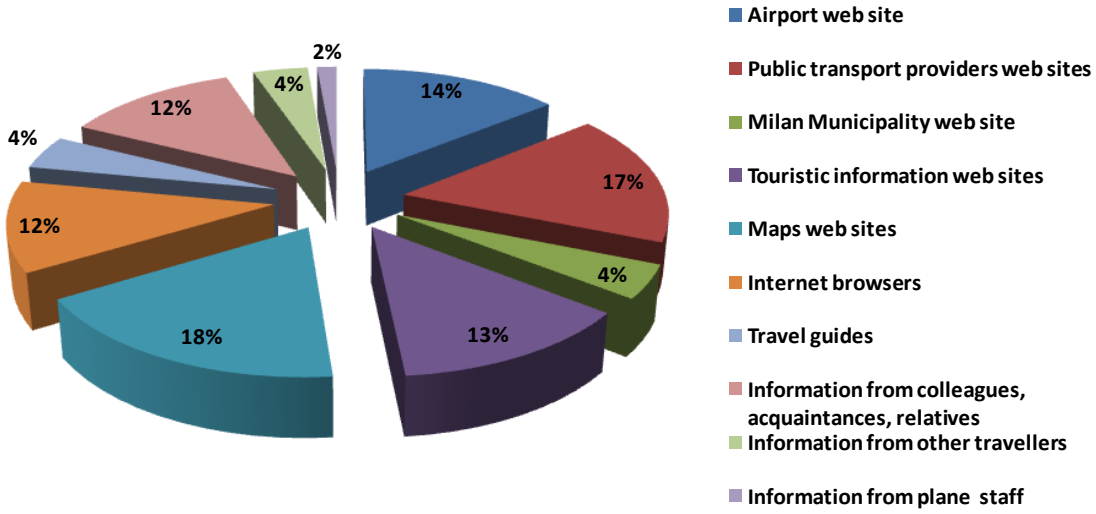
Considering the detail of the sample divided into *Italian* and *foreign* travellers, it can be noticed that 33% of Italian travellers collected pre-journey information whereas 48% of foreign travellers did. (Avoiding difficulties of communication in a different language could be an explanation for this difference).



(source: TRT elaboration on own surveys)

Figure 4-23 Percentage of Italian and foreign passengers that collected pre-journey information: 2010

Travellers collected information mainly via the Internet and generally by looking up more than one website. Interviewed travellers declared to have mainly looked up web sites providing maps[12] (18%), airports (14%) and public transport providers (17%) web pages, and sites specialised on travel[13] (13%). Only 2% of passengers collected information from aeroplane staff. Figure 4-24 provides an overview of the usage of the different sources.



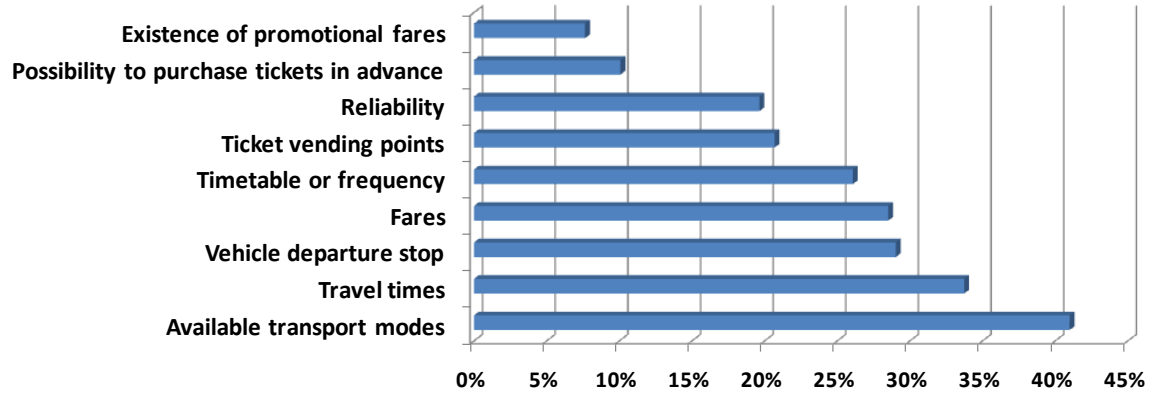
(source: TRT elaboration on own surveys)

Figure 4-24 Percentage of usage of pre-journey information sources: 2010

[12] Google Maps, Maporama, Via Michelin etc.
[13] Expedia, Edreams, etc.

Despite the information searched in advance, 35% of passengers declared their need for additional information to be collected after landing, mainly at public transport stops and at airports info points. Therefore it can be concluded that the level of information achieved by web sources is considered not completely satisfactory.

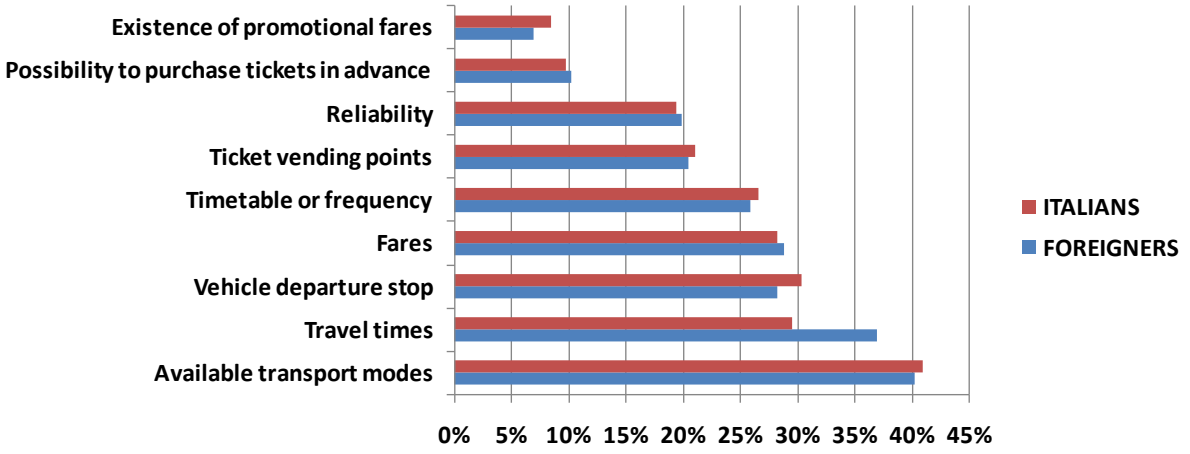
Figure 4-25 below describes the level of travel information already available to landing passengers; it can be noticed that about 41% of people are aware of intermodal interconnections available at airports, and 34% are also aware about corresponding travel times. The location of vehicles departure stops and the amount of fares is also known by 29% of travellers, whereas the information on timetables and frequencies is available to the 26% of passengers. Knowledge is more limited about the location of ticket vending points, the reliability of different transport modes, the possibility to purchase tickets in advance and the existence of promotional fares.



(source: TRT elaboration on own surveys)

Figure 4-25 Level of information available to landing passengers: 2010

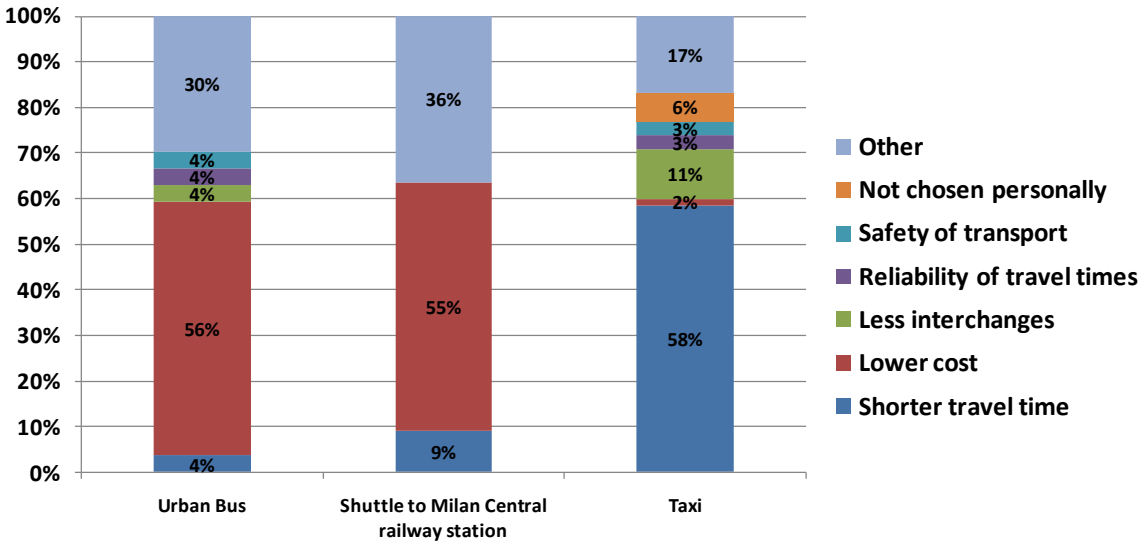
The comparison of the different level of knowledge for Italian and foreign travellers shows that no particular differences exist between the two groups, apart from the singular evidence that passengers coming from abroad seem to be more aware of travel times needed to reach their final destination (Figure 4-26). This circumstance is explained by the larger amount of foreign travellers who searched prior information.



(source: TRT elaboration on own surveys)

Figure 4-26 Level of information available to Italian and foreign passengers: 2010

Figure 4-27 summarises the main criteria adopted by passengers in their choice of public transport for leaving Linate airport. Not surprisingly, the choice of urban bus and shuttle bus is mainly driven by a lower cost in comparison with taxi, whose choice is instead mainly made for the shorter travel time.



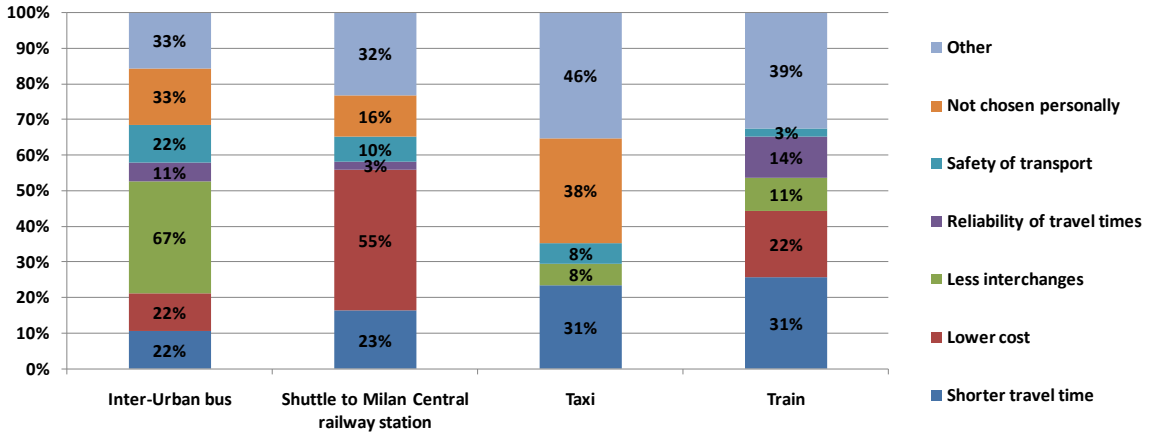
(source: TRT elaboration on own surveys)

Figure 4-27 Passengers choice criteria for public transport at Linate airport: 2010

Similarly, Figure 4-28 summarises the main choice criteria adopted by passengers leaving Malpensa airport. The choice of inter-urban bus is mainly made for the lower number of interchanges needed to reach the final destination, whereas the choice of shuttle bus is driven by the lower cost in comparison with train and taxi alternatives.

The choice of using taxi for leaving Malpensa seems to be mainly related to a pre-arranged service made available to business travellers or to a faster way to reach the final destination. Passengers who opted for trains seem to be attracted by shorter travel time and especially by more reliable travel time with respect to bus and by a lower travel cost in comparison with taxi.

It can be noticed that for all transport alternatives a significant share of interviewees made their choice for other reasons not belonging to the explicit alternatives made available in the questionnaire. This high share of "other" responses could imply that many travellers make their choice according to 'a priori' considerations based on personal preferences and prejudices rather than by evaluating alternatives in terms of their actual features like travel time and costs.



(source: TRT elaboration on own surveys)

Figure 4-28 Passengers choice criteria for public transport at Malpensa airport: 2010

4.3.2 Intermodal and Interconnection Opportunities

Out of the three airports, Malpensa is the only one with a rail connection. However, this connection is a direct one only for the city of Milan and, with an even lower service frequency, for the two intermediate stops of Saronno and Busto Arsizio. Travellers to/from outside Milan cannot reach Malpensa by train without at least one train change and, in most of cases, also without a station change. Indeed, only the provinces of Como, Lecco and Varese are connected to Milan by services of local operator LeNord stopping at Malpensa Express stations: Milano Cadorna, Milano Bovisa and Saronno. Rail services connecting other provinces arrive or depart from other Milan stations, therefore travellers have poor rail accessibility to Malpensa.

It can be furthermore noticed that the LeNord timetable is not co-ordinated to make easy interchanges at Saronno and Bovisa: even before that, for some runs, such intermediate stops have been removed from the timetable (thus worsening the quality of interconnection), trains from Malpensa stopped at Saronno just few minutes *later* than trains to Como departed from the same station.

Table 4-16 reports the characteristics of rail journeys from Lombardy provinces to Malpensa airport. The number of daily services and the first/last run are related to the rail connections between each city and Milan Centrale or Milan Cadorna stations. Figure 4-29 shows the provinces and the location of the airport.

Table 4-16 Train connections to Malpensa from Lombardy provinces and other cities

PROVINCE	AVERAGE TRAVEL TIME (min)	MINIMUM INTERCHANGES	Number daily services (from/to)	First run	Last run
Bergamo	126	2	41	04:55	22:02
Brescia	147	2	60	04:32	21:39
Como	75	1	28	05:15	21:26
Cremona	181	2	16	05:02	21:02
Lecco	136	2	30	05:15	21:59
Lodi	132.5	1	39	04:35	22:14
Mantova	206.5	1	16	05:20	19:40
Monza e della Brianza	95	2	21	06:05	22:27
Pavia	134.5	2	38	04:10	22:25
Sondrio	207.5	2	21	05:32	19:38
Varese	80.5	2	18	04:43	21:43
Torino	185	2	18	04:50	20:51
Lugano	139	2	10	06:39	21:48
Novara	84	2	23	05:41	21:40

(source: http://orario.trenitalia.com)

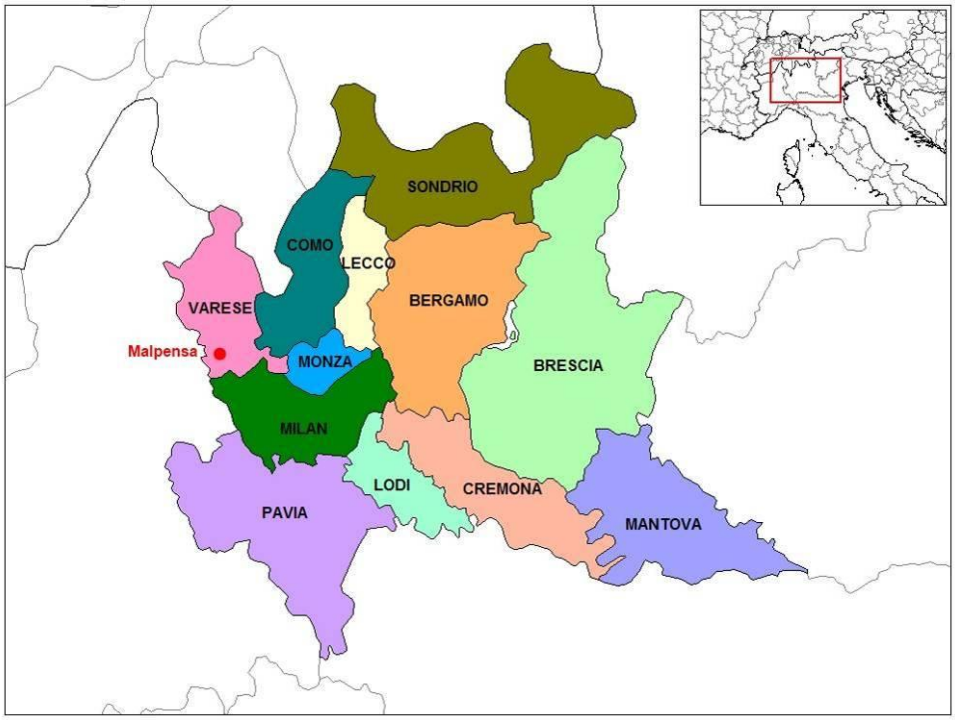


Figure 4-29 Map of Lombardy provinces

The same weakness applies to interconnection with long distance (e.g. high speed) rail services. These are mainly operated to/from Milano Centrale, which is five underground stops from Milano Cadorna. As explained above, Milano Centrale is connected to Malpensa by shuttle services, but this opportunity is much less satisfying than a direct rail connection to/from main cities served by long distance trains (e.g. Turin, Venice, Bologna, Florence). It is planned that by the end of 2010 half of the Malpensa Express runs will depart from/arrive to Milano Centrale. This could be a significant improvement of intermodal connections for Malpensa airport.

Even for those who can conveniently use the Malpensa Express, the service has some flaws. The rolling stock used for this service is constituted by double-decker carriages, designed to carry commuters and unsuitable to carry luggage. No facilities such as handling baggage or check-in operations are performed on board. Only Cadorna Station is equipped with monitors providing flights scheduling and just recently check-in operations (only for travellers with hand baggage) for a few airlines (Lufthansa, EasyJet and Eurofly) were made available.

The other two airports can be reached only by road. Despite its role as city airport, Linate is not served by an underground line and only one public service bus line connects the airport to the city, but not to the rail stations, in particular with Milano Centrale. Travellers using long distance trains have to use private shuttle services or taxi cabs.

4.3.3 Stakeholders Involved

Malpensa and Linate airports are managed by SEA public operator company. **SEA S.p.A. (Società Esercizi Aeroportuali)**, is a joint stock company controlled by the Municipality of Milan with a 84.56% share. Minor shareholders are Milan Province Authority (ASAM 14.56%) and other public and private operators (0.88%).

Orio al Serio airport is managed by **SACBO S.p.A.**, a joint stock company where SEA, the company that operates both Linate and Malpensa airports, has 31% shares whilst the remaining 69% lies in the hands of local shareholders of Bergamo County, of which Bergamo Municipality has 13.84%, Bergamo Province 13.20%, Bergamo Chamber of Commerce 13.25%, UBI Bank 17.9%, Bergamo Credit 6.96%, Italcementi 3.26% and Bergamo Manufacturer's Association 0.59%.

LeNord has been for decades a local rail operator providing the regional and suburban transport service on its own network (more than 300 km of network and 120 stations along 5 lines in the northern Milan hinterland and the provinces of Milan, Varese, Como, Novara and Brescia) and on the Milan rail bypass. In addition, it operates the Malpensa Express, the only railway link between Milan and the Malpensa intercontinental airport. A total of 800 trains per day are operated on the whole network serving more than 53 million passengers per year. In August 2009, LeNord and Trenitalia, the national rail operator, joined in a new company **Trenitalia LeNord S.r.l. (TLN)** with the purpose to unify the providers of Lombardy regional services, but the real integration of the two companies is still to be achieved.

Founded in 1932, **ATM S.p.A.** (Azienda Trasporti Milanesi) is a public limited company owned by the Milan Municipality that operates public transport in the Lombard capital and in 72 provincial towns, serving an area with a population of 2.6 million people.

ATB Mobilità S.p.A. (Azienda Trasporti Bergamo) is a public company owned by the Bergamo Municipality that operates the public transport service to over 320,000 residents in Bergamo and 27 neighbouring towns, including a direct link to Orio al Serio airport.

Several private companies operate bus connections from and to the three Milanese airports. Here below the companies providing the main services are illustrated:

- **Air Pullman S.p.A.** is a private company that operates bus services between Milan central railway station and Malpensa and Orio al Serio airports. It also operates bus connections between Malpensa and Linate airports. It also co-operates with a Swiss company in operating a bus connection between Malpensa and Lugano.
- **Autostradale S.r.l.** is a private company that operates bus services connecting Milan central railway with Orio al Serio and Malpensa airports, Brescia and Orio al Serio airport, Turin and Malpensa airport. The connection Turin – Malpensa is also provided by **SADEM S.p.A**. a private company that operates bus services in the Piedmont and Aosta Valley regions.
- **STARFLY** is a private company that supplies a bus shuttle service on the line Milan central railway station to Linate airport and vice versa.
- **Caronte S.r.l** is a private company that operates bus services between Milan central railway station and Malpensa airport. It operates also bus connections between Malpensa and Linate airports.
- **Migliavacca S.r.l** is a private company that operates bus services between Pavia and Linate airport. The service stops also in Certosa, Binasco, Lachiarella and Assago.
- **Orioshuttle** is a private company that operates bus services connecting Bergamo city, Orio al Serio and Malpensa airports.

4.3.4 Current Cohesiveness of Multi-modal Networks

One weakness of the current situation is the absence of integrated ticketing for travellers. Passengers travelling from Malpensa have to buy specific tickets for their Malpensa Express train, and other specific tickets to continue their trip by local public transport (urban or extra-urban buses, trains and metro). The same applies for bus shuttle services whose ticket does not cover local public transport.

Given its proximity to the city, Linate is served by public transport lines (73 and X73) and therefore in principle it could be possible to travel within the city with only one ticket. But if travellers choose bus shuttle services, they need to buy additional tickets to continue their trip by local public transport.

The only form of integrated ticketing is available from Orio al Serio airport. ATB, the Bergamo public transport provider, offers different ticket types for travellers who access/egress the airport by using local public transport (Table 4-17); of course only travellers whose final destination is Bergamo can benefit from these facilities.

Table 4-17 ATB tickets for airport bus

TICKET TYPE	DESCRIPTION
Timed ticket € 1.70	Allows one single journey on the direct Bergamo – airport link and all the ATB services in the 'urban area', including funicular trains, within 90 minutes of being stamped
72 hr ticket with luggage € 5.00	Allows one single and one return journey on the direct Bergamo – airport link for the 72 hours from it is stamped, and all the ATB services in the 'urban area', including funicular trains (luggage included)
24 hr ticket with luggage € 3.50	Allows one single and one return journey on the direct Bergamo – airport link for the 24 hours from it is stamped, and all the ATB services in the 'urban area', including funicular trains (luggage included)

Concerning bus shuttle services, the connection with a certain airport is generally operated by different providers who have different scheduling and therefore their cumulative frequency is high; but even though they provide the same service at the same fare, each company has its own ticket, generally sold by the bus driver before the departure.

This situation poses strong limitation in the pre-selling of connecting services: travellers are not encouraged to buy tickets on board their planes because they are not aware of which company will made the earliest run towards their destination.

4.4 SOLUTIONS ALREADY IN PLACE

Table 4-18 summarises the relevant solutions already in place for the case study and described in the previous sections.

Table 4-18 Summary of solutions already in place

SOLUTION	MALPENSA	LINATE	ORIO AL SERIO
Heavy Rail Link	X		
Shuttle Bus links between adjacent terminals	X	X	X
Link into General Bus Lines		X	X
Fewer Stops / Express Services	X	X	
Regular Interval Timetabling	X		

4.5 SOLUTIONS ALREADY ENVISAGED

Malpensa airport

As already mentioned, Malpensa airport was opened in 1998 when only two-thirds of the infrastructure was built and railway link was not yet in place.

Investment to guarantee surface accessibility to the airport was neither part of the “Malpensa 2000” project nor managed by the concessionaire.

Infrastructures were financed later, by dedicated regional and national laws and plans: in 1999 the Italian government and Lombardy region defined a program of interventions to realise an integrated system for rail and road accessibility to Malpensa airport. The program planned more than 40 interventions, and only some of them were finalised during the subsequent years.

Because of the significant delays in the completion of the program, in 2007 the Infrastructure Ministry, the Lombardy Region, the Varese Province, RFI (the Italian rail infrastructure manager) and ANAS (the Italian road infrastructure manager) signed a new agreement that updated the previous one.

After years of stagnation, today the improvement on the airports accessibility planned a long time ago is becoming reality, even though delays on the completion of some interventions are always to be expected.

In the following paragraphs the main improvements envisaged in the new programme and in other strategic plans, such as EXPO 2015 candidature dossier, are briefly outlined.

Due to the complexity of projects and the involvements of many stakeholders, it should be noted that a certain uncertainty about the execution times and about the funding of infrastructures emerge from the reading of official planning documents; therefore information on these aspects, when provided, should be considered as merely approximate.

4.5.1 New Rail Services from Malpensa to Milano Centrale

Problems addressed

New services from Milano central railway station to Malpensa airport are planned to be operative starting in September 2010. The target to be achieved is to have connections with Malpensa every 15 minutes, two each hour starting from Milano Centrale and two from Cadorna station. The new service will significantly improve Malpensa rail accessibility since Milano Centrale is the main station for long-distance rail connections and for HSR trains.

Performance against main toolkit criteria

Cost

No information on the cost of the new service is available.

Technical feasibility

The technical feasibility of this new service has been an obstacle for many years, because of the absence of a rail link connecting Milano Centrale railway station with the Malpensa Express rail line. The service is now possible after the recent completion of a new rail link (8 km) connecting Milano Centrale with Porta Garibaldi, the other RFI station, and Bovisa railway station on the Malpensa Express line (Figure 4-30).

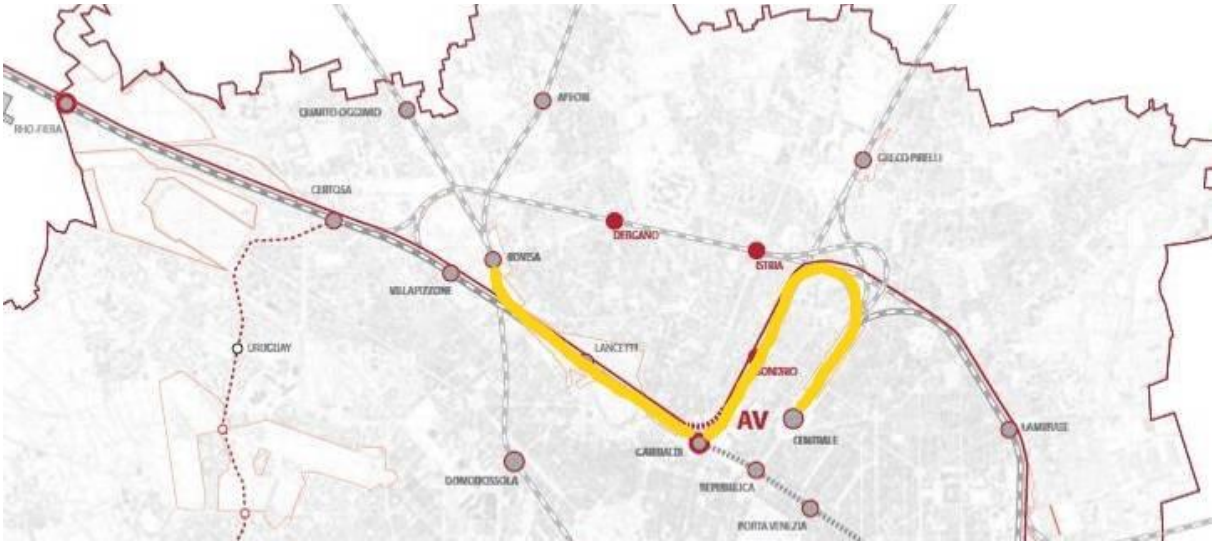


Figure 4-30 New rail link connecting Milano Centrale, Porta Garibaldi and Bovisa stations

Financial and organisational/legal feasibility

Neither financial nor organisational/legal feasibility problems.

Acceptance by users

Great acceptance by users is expected, since this service will substantially increase airport accessibility from long distance rail services.

Other aspects of political acceptability

This intervention has a high political acceptability since it fills an important gap in the network interconnectivity that has lasted for more than 10 years.

Impact on users' door to door travel time

With this new service it will be possible to reach Malpensa from Milano Centrale railway station in 30/40 minutes. The current bus shuttle services connect those locations in about 60 minutes.

Impact on users' door to door travel cost

No official estimate on the cost of this new rail service is available but the current bus shuttle service connecting Milano Centrale with Malpensa is € 7.50 , and the rail ticket of Malpensa Express (departing from Cadorna station) is € 11. It can be expected that the rail connection from Centrale to Malpensa will cost no less than € 11.

Initial impact on comfort or convenience

Great benefits for passengers' comfort are expected since this new service will avoid the need to change station for passengers arriving at Milano Centrale.

Users' safety and personal security

Travel by train is generally safer than travelling by bus or car. Security on trains is not significantly different from other modes of public transport or of car use.

Region's prestige

No impact on region's prestige.

Access for people on low incomes and people with physical disabilities

No impact on accessibility for people with low incomes. The rail connection will significantly improve the access of people with physical disabilities since the current bus shuttles are not specifically equipped for this purpose

Mode shift, congestion and GHG emission

This rail link has the clear potential to shift traveller from bus (and also car) to rail use, thereby reducing road congestion as well as GHG emissions.

4.5.2 New HSR Connections for Malpensa

Problems addressed

The completion of the above mentioned new rail link connecting Milano Centrale with Porta Garibaldi and Bovisa railway stations will also allow new HSR connections to Malpensa without the need to change train. Since September 2010 two pairs of trains will be available from Rome, Bologna and Florence to Malpensa and further service extensions are planned in the next future. The trains will travel with high speed only on the HSR network, and will continue their trip with normal speed on the conventional line.

Performance against main toolkit criteria

Cost

No information on the cost of the new service is available.

Technical feasibility

The technical feasibility of this new service has been an obstacle for many years, because of the absence of a rail link connecting Milano Centrale railway station with the Malpensa Express rail line. The service is now possible after the completion in 2010 of this new rail link (8 km) connecting Milano Centrale with Porta Garibaldi and Bovisa railway stations.

Financial feasibility

No financial feasibility problem.

Organisational/legal feasibility

The implementation of the new service will probably require the future modification of the local rail services scheduling.

Acceptance by users

This service will substantially increase airport accessibility from long-distance rail services and therefore great acceptance by users is expected; nevertheless complaints could arise from local trains users and commuters on whether the new service will impact the current rail system with a reduction of frequencies of local trains and/or the suppression of some stops.

Other aspects of political acceptability

This intervention has an high political acceptability since it fills an important gap in the network interconnectivity.

Impact on users' door to door travel time

With this new service it will be possible to reach Malpensa from Bologna, Florence and Rome with a significant travel time reduction. Current travel times have been computed by considering the travel to Milano Centrale and from it to Malpensa via Cadorna station.

Table 4-19 Travel time of future HSR connections to Malpensa

	Current Travel Time	Future Travel Time
Malpensa - Bologna	2h 30m	1h 30m
Malpensa - Florence	3h 30m	2h
Malpensa - Rome	7h 30m	4h

Impact on users' door to door travel cost

No official estimate on the cost of this new rail service is available.

Initial impact on comfort or convenience

Great benefits for passengers comfort are expected since this new service will avoid the need to change train for passengers travelling to Malpensa.

Users' safety and personal security

Travel by train is generally safer than travelling by bus or car. Security on trains is not significantly different from other modes of public transport or of car use.

Region's prestige

No impact on region's prestige.

Access for people on low incomes and for people with physical disabilities

No impact on accessibility for people with low incomes. Passengers with physical disabilities would benefit from a seamless journey on trains equipped for their needs.

Mode shift, congestion and GHG emission

The new rail connection has the clear potential to reduce traveller using bus shuttle services from Milano Centrale to Malpensa and thereby to reduce road congestion as well as GHG emissions.

4.5.3 Novara – Malpensa Rail Section Upgrade

Problems addressed

This project, illustrated with a yellow line in Figure 4-31 is fundamental for the direct connection between the HSR line Turin-Milan and Malpensa airport and, when completed, a HSR direct connection between Turin and Malpensa will be achieved.

The project requires the doubling of the section Novara – Busto Arsizio, operated by LeNord (the connection between Busto Arsizio and Malpensa already exists), the integration of the line with the new Novara HSR station and the Galliate bypass.

Between Novara and Malpensa a rail connection of 33 km already exists, but 20 km are single-track and only 13km are double tracks. The current capacity of the line is not a problem and the objective of the intervention is to increase the speed of the connection to achieve a travel time of 20 minutes between Novara and Malpensa.

The project is currently being implemented in stages, and the completion of the project is scheduled by 2012.

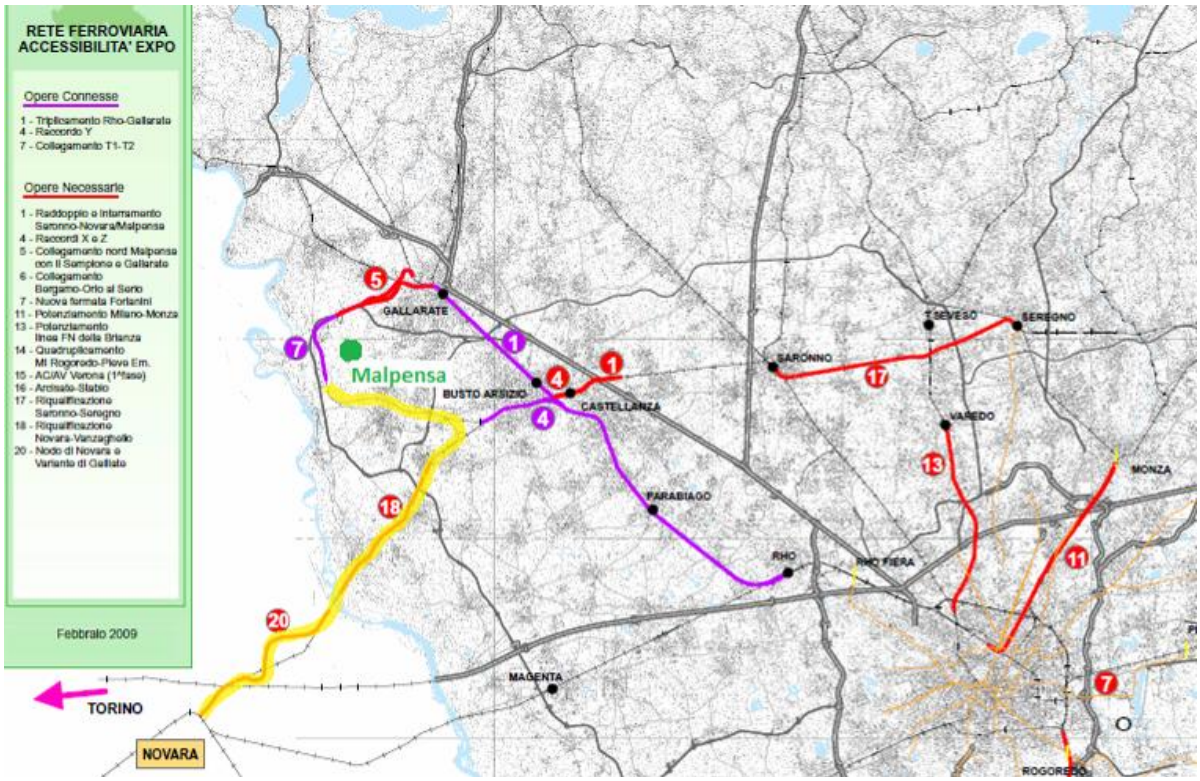


Figure 4-31 Novara-Malpensa rail section upgrade

Performance against main toolkit criteria

Cost

The cost of the intervention is of about € 150M plus € 40M for the Novara station node.

Technical feasibility

No particular difficulties.

Financial feasibility

The financial feasibility problem is related to the collection of funds: € 87M are still to be funded. Nevertheless, even with very high passenger numbers, the intervention can only be justified in overall socio-economic terms, it is very unlikely to be profitable.

Organisational/legal feasibility

There are no inherent organisational or legal problems.

Acceptance by users

A faster connection between Turin, Novara and Malpensa airport has been discussed for many years and therefore great acceptance by users is expected.

Other aspects of political acceptability

This project was already included in Malpensa accessibility plan of 1999 and then confirmed again in the 2007 plan: it has complete political acceptance.

Impact on users' door to door travel time

Turin and Malpensa will be connected with a travel time of 45 minutes against the current time of 2 hours and 10 minutes currently needed to travel from Turin to Milano Centrale and from it to Malpensa via Cadorna station. The travel time from Novara to Malpensa will be of 20 minutes.

Impact on users' door to door travel cost

HSR in Italy is more expensive if compared with a conventional rail trip, and with car. Table 4-20 shows the comparison of Turin – Milan travel costs by HSR, conventional rail and car.

Table 4-20 Turin – Milan travel costs comparison

Turin – Milan 142 km	1 CLASS €	2 CLASS €
HSR	44.00	31.00
Conventional rail	14.30	9.55
Car	24.79	

The distance between Turin and Malpensa is about 140 km and, given the similar characteristics of rail network involved into the Turin – Milan HSR and the length covered, a similar fare for this new connection should be expected.

Initial impact on comfort or convenience

HSR travel is very comfortable; the convenience of reaching the airport by train instead than by car lies in the saving of parking costs.

Users' safety

Rail travel is very safe compared to car travel.

Personal security

Rail travel on high-quality trains is, in principle, very secure, but given the fact that they particularly attract wealthier travellers, this may be off-set by the fact that they also particularly attract pick-pockets at train stations.

Region's prestige

HSR systems are prestige projects.

Access for people on low incomes

HSR does not normally replace conventional rail services, so even where they demand a premium fare, there will still be cheaper alternatives for people on low incomes.

Access for people with physical disabilities

For people with physical handicaps that prevent them from driving a car, any additional offer of a public transport system improves their access.

Mode shift, congestion and GHG emission

HSR links are likely to help reduce congestion both on motorways through encouraging a modal shift to rail travel; thereby they will also help reduce GHG emissions. This particularly applies in this case since A4 motorway is one of the most congested motorways in Italy, especially during peak hours.

4.5.4 Saronno – Seregno Rail Section Upgrade for Malpensa

Problems addressed

This project will substantially improve Malpensa rail accessibility from the Brianza province of Lombardy. The LeNord rail section is 14 km long and crosses several towns in Milan province (see Figure 4-32). Since 1957 the line has been dedicated to freight transport; in 1970 it was electrified and then, after few years of closure, converted into diesel traction.

The planned intervention has the objective to reactivate the line for passenger transport and to improve the freight line; it requires the electrification of the whole section, the doubling of tracks, the elimination of 18 rail crossings and the implementation of signalling and communication systems.

The kick-off of the intervention was on January 2010. The completion is planned for 2012.

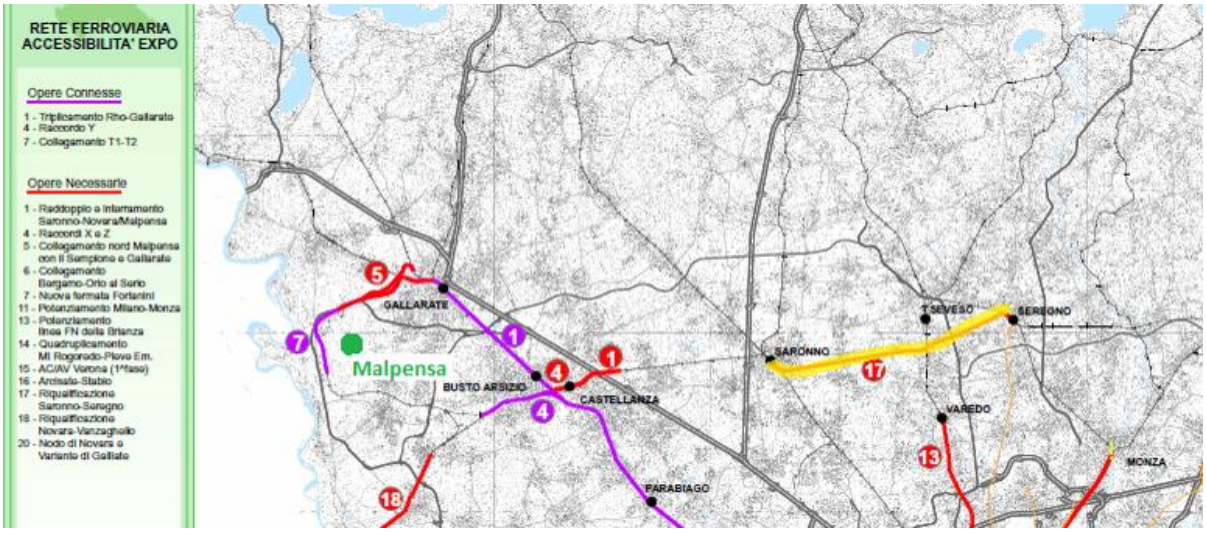


Figure 4-32 Saronno-Seregno rail section upgrade

Performance against main toolkit criteria

Cost

The cost of the intervention is about € 76M.

Technical feasibility

No difficulties.

Financial feasibility

The project has been totally funded and therefore there is no financial feasibility problem. Nevertheless, even with very high passenger numbers, the intervention can only be justified in overall socio-economic terms, but it's very unlikely to be profitable.

Organisational/legal feasibility

There are no general problems with regard to the organisational and legal feasibility of the project.

Acceptance by users

The project is an upgrading of an existing link and not a new construction impacting on the territory; it will provide better accessibility not only to the airport, but also to other destinations in the region and therefore a complete acceptance by users is expected.

Other aspects of political acceptability

This project was already included in Malpensa accessibility plan of 1999, and then confirmed again in the 2007 plan and in the EXPO2015 dossier: it has complete political acceptance.

Impact on users' door to door travel time

No official figures on users travel time reduction are available but the rehabilitation of the Seregno-Saronno line will significantly reduce travel time by directly connecting Seregno, and thus potentially the rail line towards Bergamo, with the Malpensa Express rail line in Saronno.

Just to provide an example Table 4-21 summarises the features of the current connections Seregno – Malpensa. The rail connection is currently achieved with two interchanges and an average travel time of nearly two hours.

Table 4-21 Seregno – Malpensa travel costs comparison

Seregno - Malpensa 64 km	1 CLASS €	2 CLASS €	Time
Current rail connection: **Seregno -> Camnago-Lentate (RFI)** **Camnago-Lentate - > Cadorna (LeNORD)** **Cadorna -> Malpensa (LeNORD - € 11)**	16.90	15.40	1 h 50 m
Car	7.44		50 m*

* During off-peak hours

An estimate of the Seregno – Malpensa travel time could consider the current travel time Saronno - Malpensa (25 minutes or 17 minutes depending on the number of intermediate stops) and the time to cover the 14 km Seregno – Saronno section (13 – 20 minutes depending on the number of intermediate stops). It is likely that an interchange in Saronno will be needed.

Impact on users' door to door travel cost

An estimate of the cost of the Seregno – Malpensa rail fare can be made by considering the current cost of the connection Saronno – Malpensa (€ 6) and the cost of 14 km travelled on LeNord network (€ 2.45 in 1st class and € 1.65 in 2nd class).

Initial impact on comfort or convenience

Train travel is the most comfortable form of travel as long as trains are not overcrowded.

Users' safety

Train travel is a very safe transport mode.

Personal security

Security on trains is not significantly different from other modes of public transport or of car use.

Region's prestige

No particular effects.

Access for people on low incomes

For people on very low incomes, who do not own a car, any additional public transport link improves access, since public transport will always be cheaper than the use of taxis, which would be their main alternative.

Access for people with physical disabilities

For people with physical handicaps that prevent them from driving a car, any additional offer of a public transport system improves their access.

Mode shift, congestion and GHG emission

A rail link has the clear potential to shift traveller from car to rail use, thereby reducing road congestion as well as GHG emissions.

4.5.5 Heavy Rail Link for Malpensa: New Rail Connections with Simplon and Gottardo Lines

Problems addressed

The realisation of the new 8 km rail link Arcisate-Stabio, together with two new double-track connections between Malpensa Terminal 2 and the rail lines Gallarate-Varese and Gallarate-Domodossola, will significantly improve in the long term the rail accessibility of Malpensa from Switzerland by connecting respectively Lugano, Bellinzona, Zurich and Basel on the Gotthard line (via Arcisate-Stabio) and Bern, Lausanne and Geneve on the Simplon line. These interventions will significantly enlarge the catchment area of the airport.

The Arcisate-Stabio link is currently ongoing and planned to be operative in 2013; two new double-track connections are planned to be completed in 2017.

Figure 4-33 shows both the new rail link and the interconnections in yellow.

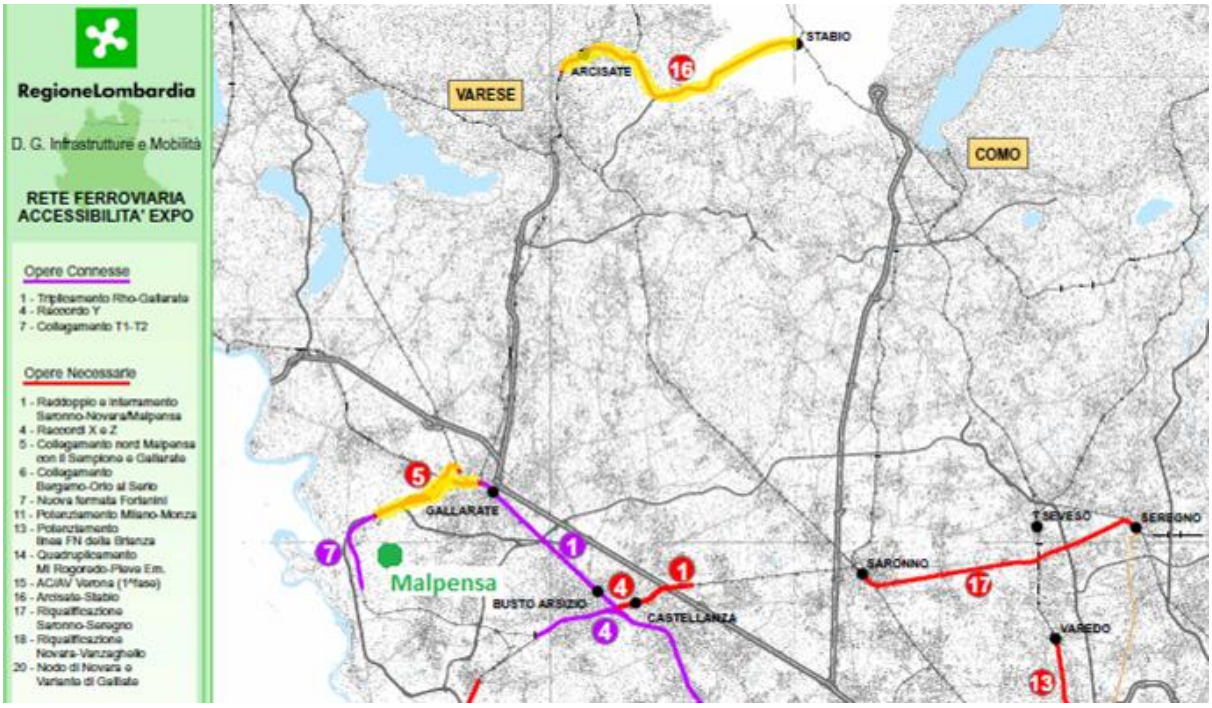


Figure 4-33 New rail connections with Simplon and Gotthard lines

Performance against main toolkit criteria

Cost

The Arcisate-Stabio cost is € 223M. The two new double-track connections cost € 135M.

Technical feasibility

No particular technical difficulties are related to the project.

Financial feasibility

The project has some funding problems: while the Arcisate-Stabio section is totally funded, the funding of the new double-track connections is still to be achieved. Nevertheless, even with very high passenger numbers, the intervention can only be justified in overall socio-economic terms, but it's very unlikely to be profitable.

Organisational/legal feasibility

There are no general problems with regard to the organisational and legal feasibility of the project.

Acceptance by users

Generally inhabitants raise some complaints when a new infrastructure is to be built on their territory. This has happened to an extent in this case, but the project is generally well accepted by users.

Other aspects of political acceptability

The project has complete political acceptability given its importance for international connections with Switzerland.

Impact on users' door to door travel time

The current rail connection between Malpensa and Lugano or Bellinzona is via Milano Centrale and Cadorna stations with an average travel time respectively of 120 and 140 minutes.

Travel time by car is 1 hour from Lugano and 1h 15 m from Bellinzona.

When the project is completed, it will be possible to reach Malpensa airport in 50 minutes from Lugano and in 70 minutes from Bellinzona; travelling from Domodossola to Malpensa will last 57 minutes and from Varese to Malpensa 20 minutes.

Impact on users' door to door travel cost

Currently a rail trip between Malpensa and Lugano costs € 37 in 1st class or € 30.50 in 2nd class; the trip made by car costs about € 40. The new rail connections will certainly reduce travel costs.

Initial impact on comfort or convenience

Train travel is the most comfortable form of travel as long as trains are not overcrowded.

Users' safety

Train travel is a very safe transport mode.

Personal security

Security on trains is not significantly different from other modes of public transport or of car use.

Region's prestige

No particular effects are expected.

Access for people on low incomes

For people with physical handicaps that prevent them from driving a car, any additional offer of a public transport system improves their access.

Access for people with physical disabilities

For people with physical handicaps that prevent them from driving a car, any additional offer of a public transport system improves their access.

Mode shift, congestion and GHG emission

A rail link has the clear potential to shift traveller from car to rail use, thereby reducing road congestion as well as GHG emissions.

4.5.6 Rho-Gallarate Rail Section Upgrading for Malpensa

Problems addressed

The project, in yellow in Figure 4-34, requires the upgrading of the RFI rail section Rho-Gallarate with a third track beside the existing two tracks for 25 km, and a fourth track for the section Rho-Parabiago. This intervention, together with an additional interconnection to connect the RFI line with the existing LeNord line for Malpensa, will significantly improve airport accessibility from Milan territory by achieving a direct connection between Malpensa and the RFI Rho-Pero station. It should be noticed that Rho hosts the new Milan exhibition centre that will be the fulcrum of EXPO 2015.

Apart from the new connection with airport, the upgrading of this line will significantly improve regional rail transport by activating a new suburban line S15 Milano – Parabiago, increasing the service frequency to 15 minutes, improving the service to Gallarate and by strengthening the connections towards Varese, Luino and Domodossola.

The intervention might be kicked off in 2012 and completed for 2014.

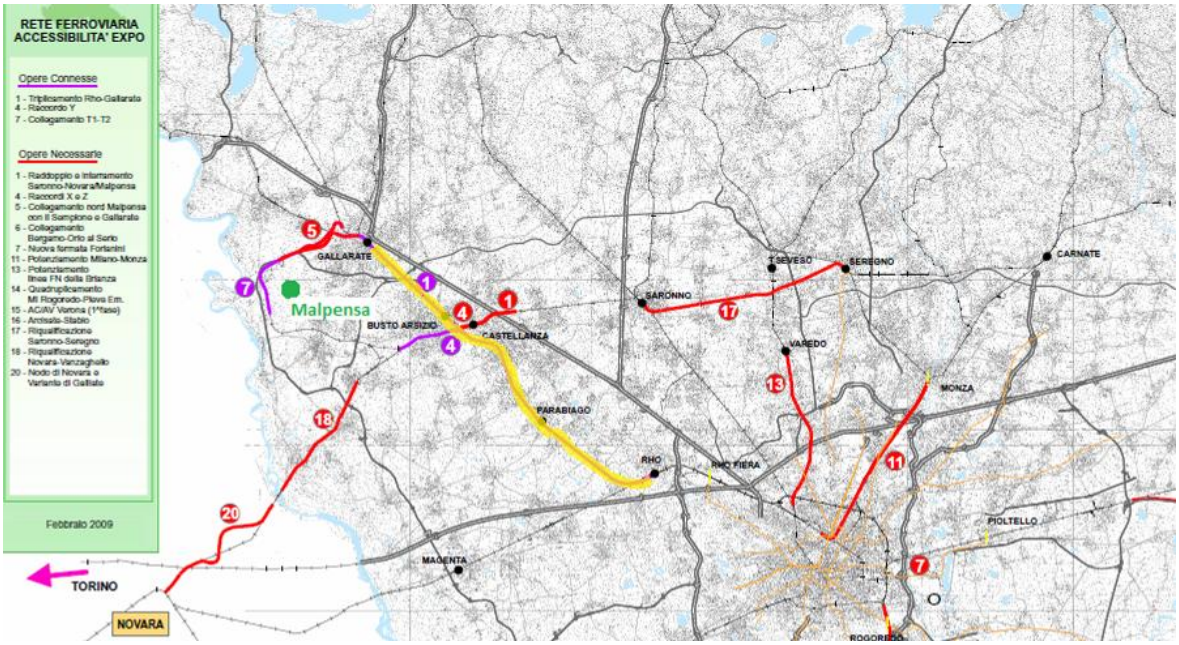


Figure 4-34 Rho-Gallarate rail section upgrading

Performance against main toolkit criteria

Cost

The total cost of the intervention is € 628M.

Technical feasibility

No technical difficulties.

Financial feasibility

The project is not fully funded; only € 401M is currently available. Nevertheless, even with very high passenger numbers, the intervention can only be justified in overall socio-economic terms, but it's very unlikely to be profitable.

Organisational/legal feasibility

There are no general problems with regard to the organisational and legal feasibility of the project.

Acceptance by users

The project has been contested by the inhabitants along the Rho – Parabiago section because of the realisation of the fourth track and its impact on the territory. But the final project has been approved and financed by CIPE (Interministerial Committee for Economic Planning) in May 2010, who accepted the requests of local inhabitants related to impacts mitigation interventions.

Other aspects of political acceptability

This project was already included in Malpensa accessibility plan of 1999, and then confirmed again in the 2007 plan and in the EXPO2015 dossier; it has complete political acceptance.

Impact on users' door to door travel time

No official figures on future travel time are available. The current rail connection between Rho and Malpensa requires an interchange in Busto Arsizio and an average travel time of 1 hour and 10 minutes.

Impact on users' door to door travel cost

No official figures on future travel costs are available.

Initial impact on comfort or convenience

Train travel is the most comfortable form of travel as long as trains are not overcrowded.

Users' safety

Train travel is a very safety transport mode.

Personal security

Security on trains is not significantly different from other modes of public transport or of car use.

Region's prestige

No particular effects are expected.

Access for people on low incomes

For people with physical handicaps that prevent them from driving a car, any additional offer of a public transport system improves their access.

Access for people with physical disabilities

For people with physical handicaps that prevent them from driving a car, any additional offer of a public transport system improves their access.

Mode shift, congestion and GHG emission

A rail link has the clear potential to shift traveller from car to rail use, thereby reducing road congestion as well as GHG emissions.

4.5.7 New Rail Connection Between Malpensa Terminal 1 and Terminal 2

Problems addressed

The project is an extension of the current rail line to Terminal 2. This intervention will significantly improve the accessibility of Malpensa Terminal 2 and, together with the other planned intervention will complete the rail network around the airport. The intervention is planned to be completed in 2014.

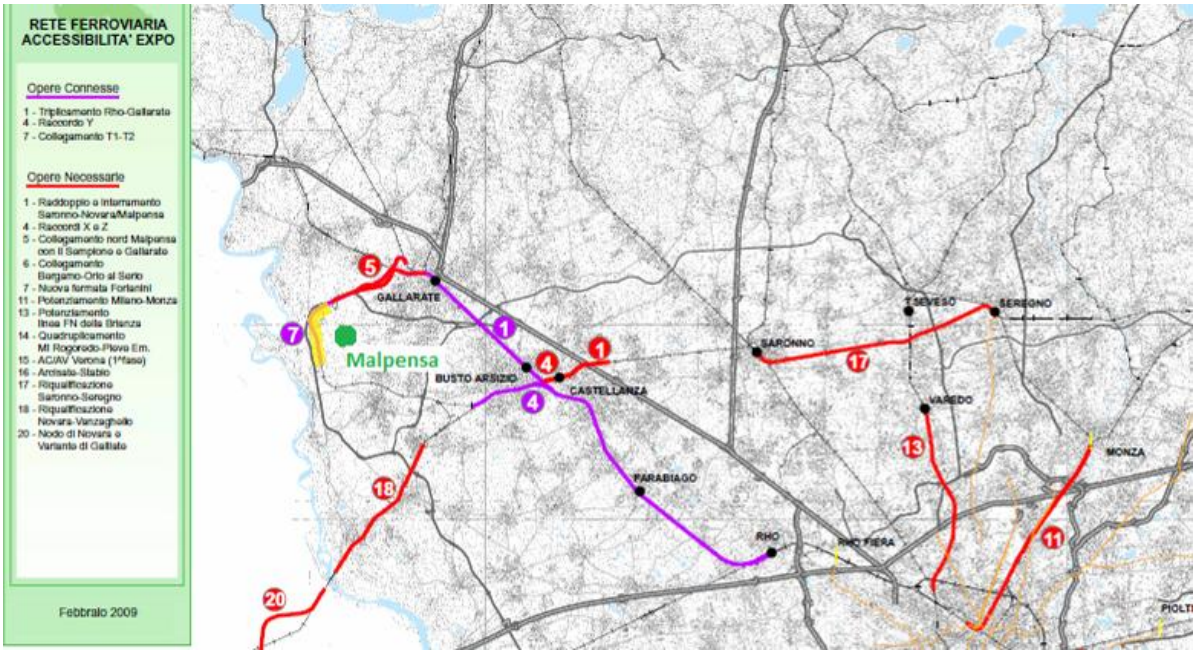


Figure 4-35 New rail connection between Malpensa Terminal 1 and Terminal 2

Performance against main toolkit criteria

Cost

The estimated cost is € 140M.

Technical feasibility

No problem related to technical feasibility

Financial feasibility

The whole amount for the project is still to be funded. Nevertheless, even with very high passenger numbers, the intervention can only be justified in overall socio-economic terms, but is very unlikely to be profitable.

Organisational/legal feasibility

No problem related to organisational or legal feasibility are envisaged.

Acceptance by users

This rail connection will have high acceptance by users since the existing bus connection between the terminal is almost unreliable.

Other aspects of political acceptability

The project has complete political acceptability

Impact on users' door to door travel time

No official figures on travel time reduction are available; travel time between the two terminals is estimated at around five minutes.

Impact on users' door to door travel cost

No official figures on travel costs are available.

Initial impact on comfort or convenience

The connection will significantly increase the accessibility of Terminal 2 and the comfort of travellers who would not need any more to interchange in the Terminal 1 rail station for taking the bus shuttle to Terminal 2.

Users' safety

Travel by rain is generally safer than travelling by car or bus.

Personal security

No impact on personal security

Region's prestige

No impact on region's prestige

Access for people on low incomes

No impact on accessibility for people with low incomes

Access for people with physical disabilities

The rail connection will significantly improve the access of people with physical disabilities since the current bus shuttles are not specifically equipped for this purpose.

Mode shift, congestion and GHG emission

The activation of the rail link will eliminate or at least reduce the need for bus shuttle services, with a potential reduction of GHG emissions.

4.5.8 New Rolling Stock for Malpensa Express Service

Problems addressed

As already mentioned the current rolling stock used for providing the Malpensa Express service is constituted by double-decker carriages, designed to carry commuters and unsuitable to stock luggage. Furthermore no information on the scheduling of flights is provided on board.

In order to replace the unsuitable rolling stock so far used, the operator LeNord has committed Alstom, a French group leader in the mechanic construction sector, to the supply of 6 new trains Coradia Meridian.

The new trains will have 5 carriages with 230 seats and a maximum speed of 160 km/h. They will be specifically equipped with suitable places to store luggage, with mobile devices to enable stageless

entering of trains, with Braille signals for blind users, with security cameras and displays to provide information to customers. The new rolling stock will be operative by the end of 2010.

Performance against main toolkit criteria

Cost

The cost of the new rolling stock is € 36M for six trains.

Technical feasibility

No technical feasibility problem.

Financial feasibility

No financial feasibility problem.

Organisational/legal feasibility

No organisational/legal problem

Acceptance by users

The new rolling stock will certainly encounter great acceptability by users.

Other aspects of political acceptability

Complete political acceptability.

Impact on users' door to door travel time

No impact on travel time is expected.

Impact on users' door to door travel cost

No impact on travel cost is expected.

Initial impact on comfort or convenience

The new trains will substantially increase passengers' comfort.

Users' safety

No impact on users' safety.

Personal security

The new trains will substantially increase passengers' security given their equipment with security cameras.

Region's prestige

No impact on region's prestige.

Access for people on low incomes

No impact on accessibility for people with low incomes.

Access for people with physical disabilities

The new trains will substantially increase accessibility for people with physical disabilities given their specific equipment with mobile devices to enable stageless entering of trains.

Mode shift, congestion and GHG emission

No impact on modes shift, congestion and GHG emissions are expected.

4.5.9 Improving Road Network Accessibility for Malpensa

Problems addressed

Several projects are planned in order to improve Malpensa airport's accessibility by road. Here below they are briefly outlined.

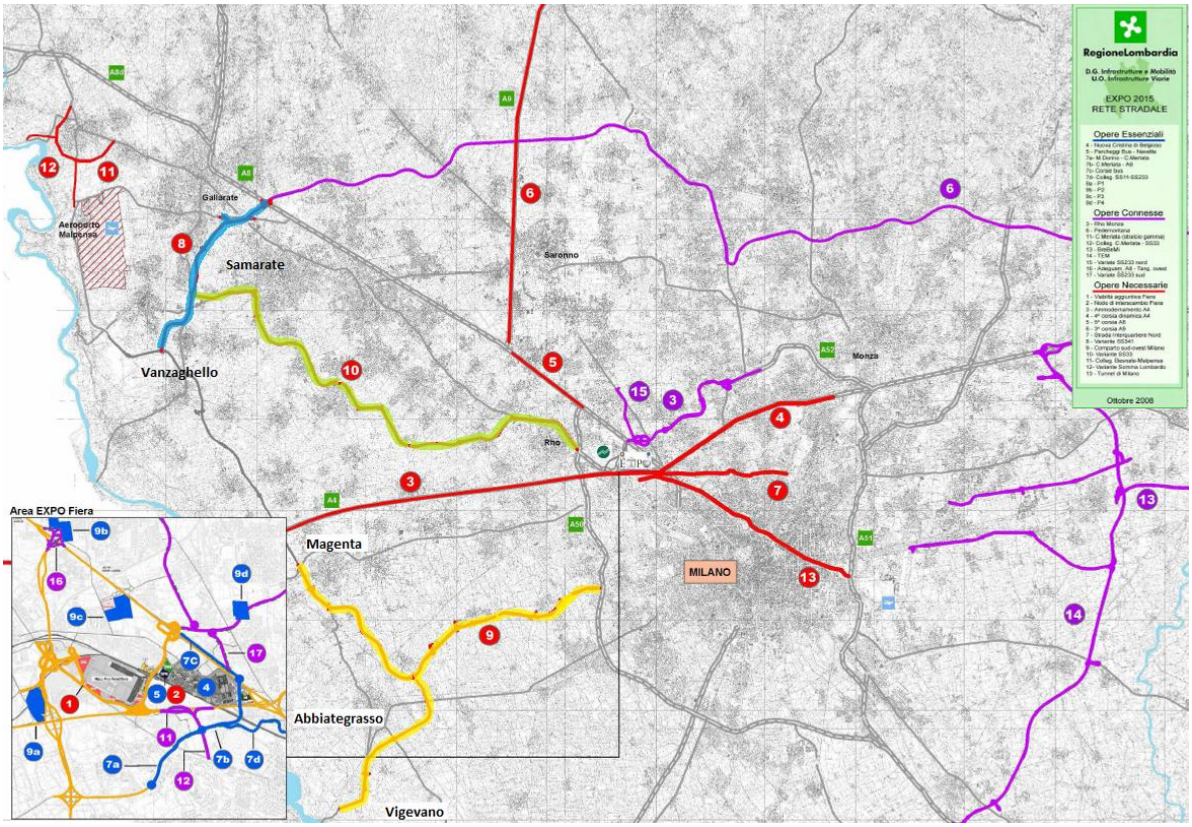


Figure 4-36 Malpensa road accessibility improvements

Magenta - Milan West orbital motorway: The project requires a new road from Magenta to Abbiategrasso (an extension of the already existing Boffalora-Malpensa section), the improvement of the secondary level roads SP114 (between Abbiategrasso and Milano) and SS494 (between Abbiategrasso and Vigevano). When completed a better connection between Malpensa and the western Milanese metropolitan area will be achieved. The project (in yellow in Figure 4-36) costs € 281M and it is totally funded.

SS341 Vanzaghello-Samarate and Gallarate new branches: This new 9.4 km section (displayed with a blue line in Figure 4-36) together with the Gallarate branch will realise a new connection between Malpensa-Boffalora branch and the A8 motorway. The importance of this new connection is strictly linked to the completion of the "Pedemontana" motorway described below. The project has been funded with € 133M, but € 40M is still to be funded. On April 2010 the call for tender of the definitive project was concluded.

New branch SS33 Simplon Rho-Gallarate. This is a 30 km new road that will connect Rho with SS341 new branch. The project cost is € 281M and it has been partially funded for € 40M. It is illustrated with a green line in Figure 4-36.

Apart from the above mentioned, additional interventions planned for improving the road network connectivity in Lombardy region will substantially improve airport accessibility even though they are not mentioned in the specific plans developed for Malpensa. Among them, the most strategic project is the **Pedemontana Lombarda** motorway (see Figure 4-37). It's a new motorway system composed of 87 km of motorway plus 70 km of connected exit ramps, secondary local roads etc, crossing five provinces of the Northern Lombardy territory. It will connect the A4 motorway close to Brembate to Gallarate and it will provide an alternative route to the highly congested A4 motorway.

The project is currently being implemented in different stages and its completion is planned in 2015. Total cost is € 4,760M, of which € 645M is still to be funded.

Figure 4-37 Pedemontana Lombarda motorway

Performance against main toolkit criteria

Cost

The total cost of Magenta - Milan West orbital motorway, SS341 Vanzaghello-Samarate and Gallarate new branches and of the new branch SS33 Simplon Rho-Gallarate is € 735M.

The Pedemontana Lombarda motorway has an estimated cost of € 4,760M.

Technical feasibility

Even though the projects illustrated are related to new infrastructures to be built in a highly densely populated region, in general they have no insurmountable technical barriers to implementation.

Financial feasibility

The main problem related to the financial feasibility is related to the collection of funding.

Organisational/legal feasibility

No organisational/legal problem.

Acceptance by users

Some projects are opposed by the local inhabitants because of their impact on the territory. But generally this opposition does not constitute a barrier to the implementation of interventions since mediation is usually achieved in the form of mitigation interventions and monetary compensation.

In the case of the Pedemontana motorway, there is a big intervention of land requalification that includes 700 ha of parks along the infrastructure.

Other aspects of political acceptability

These projects have been discussed for decades and already included in several strategic plans and then confirmed again in the EXPO2015 dossier; they have complete political acceptance.

Impact on users' door to door travel time

The planned interventions will improve airport road accessibility by providing alternative routes to Malpensa and by allowing the diversion of traffic from the very congested A4 and A8 motorways. Therefore, even though motorways are in general faster than secondary roads, the new connections could provide time savings during peak-hours.

A different consideration should be made for the Pedemontana Lombarda motorway: when it is completed it will be possible to reach Malpensa from Bergamo in 60 minutes against the 90 minutes needed today.

Impact on users' door to door travel cost

Some of the proposed interventions represent alternative routes to tolled motorways and therefore they are likely to provide a moderate reduction of travel costs, at least in terms of tolls.

Initial impact on comfort or convenience

Travelling on uncongested roads is likely to provide more comfort to users even though travelling on motorways is more comfortable.

Users' safety

Motorways have the lowest accident rates of all types of road and therefore in principle travelling on secondary roads could be less safe than travelling on motorways.

Personal security, region's prestige, access to people on low incomes and people with physical disabilities

No particular effects are expected.

Other Impacts

Mode shift, congestion and GHG emission

The planned interventions would allow to divert part of traffic from the very congested A4 and A8 motorways, with a potential reduction in GHG emission.

Linate airport

4.5.10 New Metro Connection with Linate

Problems addressed

The M4 metro line is 15 kilometres from Lorenteggio to Linate airport and is planned to be completed for EXPO2015.

The project is organised in two parts:

- Sforza/Policlinico – Linate airport, the eastern 8 km section;
- Lorenteggio – Sforza/Policlinico, the western 7 km section.

The new line will be a "light" subway completely automated (without driver) and will be able to transport 60,000 passengers per hour.

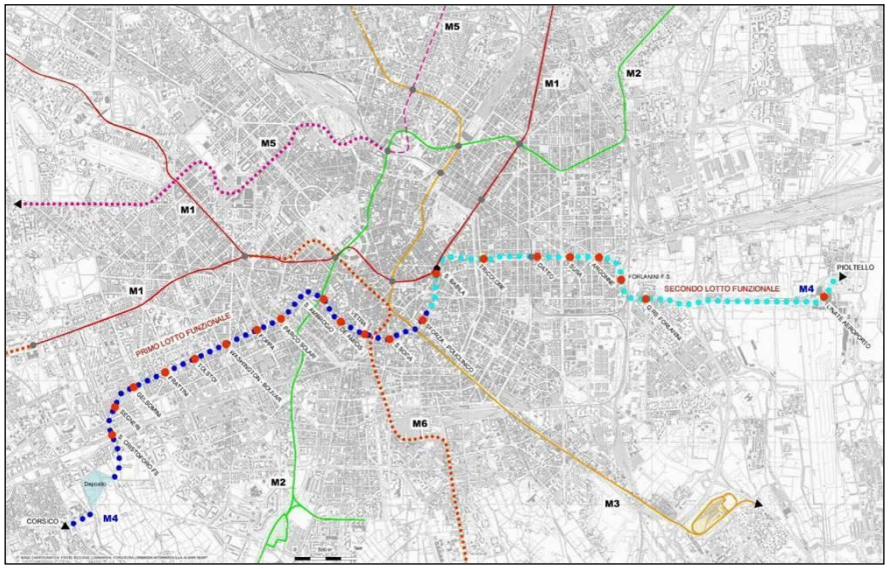


Figure 4-38 New M4 metro line to Linate

The project will significantly improve Linate airport's accessibility by providing a direct connection between the city and the airport. The new line will interchange with all the three existing metro lines and with the three rail stations San Cristoforo FS, Dateo and Forlanini FS (the last is a new planned rail station). Furthermore, in order to promote passenger intermodality, the realisation of two interchange parking areas in San Cristoforo (2,000 spaces) and Forlanini Tre Ponti (1,260 spaces) is also planned.

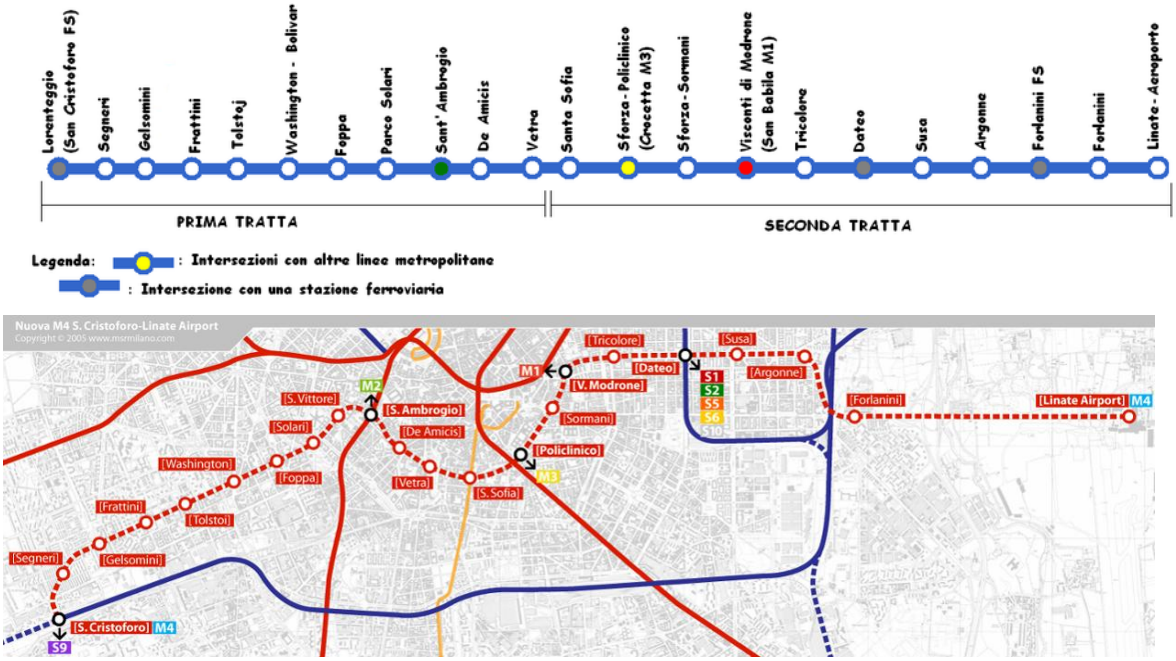


Figure 4-39 New M4 metro line stops and interchanges

Performance against main toolkit criteria

Cost

The total cost of the intervention is € 1,698M; Sforza/Policlinico – Linate airport section costs € 910M Lorenteggio – Sforza/Policlinico section costs € 789M.

Technical feasibility

Even though the construction of a new metro line is not an easy task, no particular technical difficulties are expected.

Financial feasibility

The project is funded as follows:

- Sforza/Policlinico – Linate airport section: € 350M Milan Municipality, € 199M private operators in project financing, € 240M central government.
- Lorenteggio – Sforza/Policlinico section: € 91M Milan Municipality, € 273M private/public company in project financing, € 546M central government.

Organisational/legal feasibility

Even though this project has been contested in the past by taxi and shuttle bus lobbies, no organisational/legal problems are expected.

Acceptance by users

Users have been waiting for the project for many years: it is well accepted as every extension of the underground network.

Other aspects of political acceptability

The project have been discussed for years and then included in the EXPO2015 dossier: it has complete political acceptance.

Impact on users' door to door travel time

An estimate on travel time can be made by considering the San Babila – Linate section. Today the X73 express bus line with no intermediate stops connecting San Babila with Linate should take 25 minutes, but the travel time is heavily dependent on traffic conditions and usually it takes about 30-35 minutes. With the new metro connection a travel time of 15-20 minutes is expected together with more reliability of the service.

Impact on users' door to door travel cost

The new metro connection will presumably cost the same than the current metro connections: € 1 for 75 minutes ride. Given the connection of this new line with M2 and M3 lines it would be possible to travel from Milano central railway station to Linate by metro at € 1 rather than using bus shuttles whose cost is from € 4 to € 5.

Initial impact on comfort or convenience

Travel by metro is far from comfortable when overloaded. Access and egress may be less straightforward than that to a bus and this may detract from the increased convenience of a faster service.

Users' safety

Rail services are generally safer than buses or coaches.

Personal security

Where access and egress involve underground passages this could compromise personal security in the evening or night time.

Region's prestige

Metro systems carry a high prestige value.

Access for people on low incomes

For people on very low incomes, who do not own a car, any additional public transport link improves access, since public transport will always be cheaper than the use of taxis, which would be their main alternative.

Access for people with physical disabilities

For people with physical handicaps that prevent them from driving a car, any additional offer of a public transport system improves their access.

Mode shift, congestion and GHG emission

Metro is very likely to attract former car users and therefore to reduce road congestion and GHG emissions.

4.5.11 Maxi-Tunnel from A8 Motorway to Linate Airport

Problems addressed

A 15 km tunnel crossing the city and connecting the A8 motorway with eastern Milan orbital road have been discussed for many years and it is also mentioned in Milan Territory Masterplan (PGT), and in the EXPO 2015 candidature dossier. The project, including several exits in the city, would significantly improve Linate airport's accessibility by road since Forlanini exit is the closest one to the airport.

The technical project has been recently submitted to Milan Municipality for the approval; the works, divided in several lots, are planned to start on 2011 and should be completed in 2018. For 2015 only part of the tunnel might be available.

Figure 4-40 New Maxi-Tunnel from A8 motorway to Forlanini

Performance against main toolkit criteria

Cost

The updated estimate of cost is € 2,400M.

Technical feasibility

It is a very complex project, likely to face serious technical barriers to implementation.

Financial feasibility

The project should be totally financed by private operators who will receive a 60 years concession.

Organisational/legal feasibility

No serious organisational/legal barriers to implementation.

Acceptance by users

The project is controversial. Given the high cost and the complexity of the project, it is rather unpopular with people who would prefer to have improved metro connections than a tolled tunnel crossing the city; other inhabitants are in favour of the project since it could provide a faster alternative to the congested Milan's orbital road.

Other aspects of political acceptability

Given the high cost and the complexity of the project, it is not well accepted by all political parties.

Impact on users' door to door travel time

The project has a great potential in reducing travel time since it will be an alternative to the very congested Milan orbital road.

Impact on users' door to door travel cost

Several estimates on tolls have been presented during recent years, ranging from € 0.50 to € 0.90 € Km. With the latter fare, the cost for travel on the whole length would be of about € 13, a cost much higher than the current tolls (about € 2) on the Milan orbital road.

Initial impact on comfort or convenience

Travelling on uncongested roads could be perceived as more comfortable than travelling on congested ones.

Users' safety, personal security, region's prestige, access to people on low incomes and people with physical disabilities

No impact

Mode shift, congestion and GHG emission

Potential reduction of congestion on Milan orbital road.

Orio al Serio airport

4.5.12 Heavy Rail Link or Monorail / People Mover for Orio al Serio: New Connection with Bergamo

Problems addressed

Among the infrastructures included in the Expo 2015 candidature dossier a proposal for a 4 km rail connection between Bergamo and Orio al Serio airport is presented. The estimated cost is € 170M totally to be funded. No information on technical characteristics is currently published; by the end of 2010 a preliminary project should be presented. Given the embryonic status of the proposal is not possible to provide an assessment of the expected impacts, nevertheless it can be said that the project could have a strategic relevance only if this new connection would provide direct long distance rail connections to the airport from Milan and the rest of the Lombardy region. In all the other cases it seems not financially sustainable to realise a rail connection with Bergamo and an alternative solution already envisaged is the construction of a monorail or the realisation of a TramTrain solution.

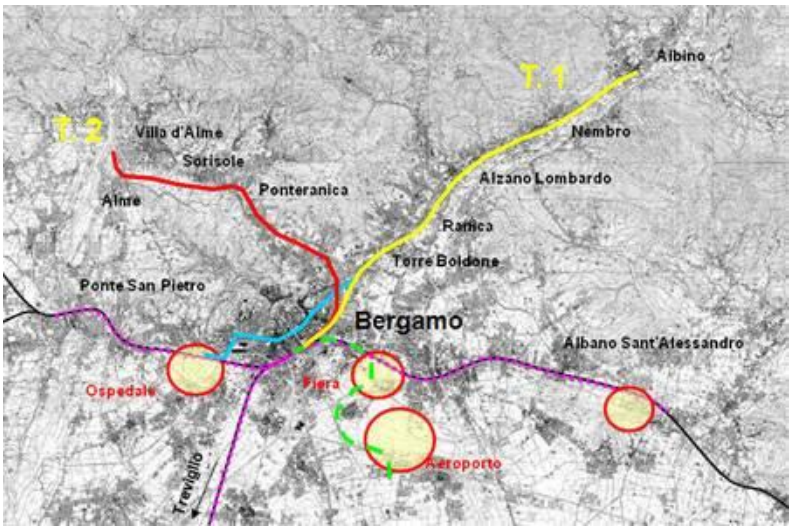


Figure 4-41 New rail connection between Bergamo and Orio al Serio

4.6 PROBLEMS STILL TO BE SOLVED

The improvements already in the pipeline of the public administration seem to be mostly focused on filling infrastructure gaps. This is especially true for Malpensa, whose land side accessibility has been for many years the main obstacle to its development as a strategic international hub.

Even though the completion of infrastructures' programme is understandably the main concern of public bodies, some other weaknesses related to passenger interconnectivity can be detected in the current system.

4.6.1 Lack of Integrated Ticketing

As already mentioned, currently there is no integrated ticketing for multi-modal services;: there is no air/rail integration, nor rail or bus-shuttle integration with local public transport. The same lack applies for air/bus-shuttle integration, even though recently Lufthansa has started marketing this integration, though only for business-class travellers departing from Malpensa.

The lack of ticket integration also affects the same bus service connecting Malpensa to Milano Centrale railway station, which is operated by different companies. The provision of the same service by different operators can represent an opportunity to avoid the establishment of a monopolistic position of a single provider; nevertheless, given that currently it does not provide any form of competition (different operators have the same tariff), a unification of tickets should be achieved. This unification could allow the pre-selling of bus tickets directly on board of planes and at the baggage claim area.

4.6.2 Lack of Adequate Information to Users

As far as concerns information to users, the interconnections opportunities from/to airports are mainly illustrated by the airports' websites and they allow for a comprehensive overview of the available transport modes if a pre-journey search for information is made. Additional information can be collected also from public transport providers' websites.

Nevertheless the surveys made in the context of the INTERCONNECT project revealed that the level of information achieved from web sources is not completely satisfactory.

This evidence further stresses the importance of providing adequate information to travellers within airports and, in the case of Milanese airports, it could certainly be improved. As an example, displays showing on-time information about the next departures from the airport of both rail and bus services could be provided at the baggage claim area. In addition, machines selling bus or rail tickets could be made available. Even though Malpensa airport is equipped with a train ticket vending machine in the baggage area, it is currently underused because there is not sufficient train information to users.

4.6.3 Lack of Check-in Facilities

Passengers' interconnectivity could also be enhanced by providing additional services at interchanges. Cadorna and Milano Centrale rail stations are not equipped with electronic machines to allow check-in operations. No baggage handling service is available. Also, Malpensa rail station is not equipped with check-in points.

Just recently at Cadorna station it has become possible to check in only for three airlines, and this operation is only possible at the ticket vending counter, and thus only during the office working time.
Trains to Malpensa airport don't provide either check-in or luggage drop facilities to rail users; the provision of in-train check-in facility is foreseen only for future HSR services.

4.7 POTENTIAL SOLUTIONS

Table 4-22 summarises the potential solutions addressing the problems still to be solved described in the previous sections.

Table 4-22 Summary of potential solutions

SOLUTION	MALPENSA	LINATE	ORIO AL SERIO
Integrated Ticketing for Air and Rail	X		
Integrated Ticketing for Rail & Local Public Transport	X		
Train Information / Tickets at Baggage Claim Area of Airports	X		
Bus Information / Tickets at Baggage Claim Area of Airports	X	X	X
At-Station Check-in for Flights *	X	X	X
Check-in point at airport stations	X		
In-Train Check-in for Flights	X		

* Check-in facilities for all airports should be available at Milano Centrale railway station since it is an interchange for all the bus shuttle services.

4.8 SUMMARY OF CONCLUSIONS

The present case study focused on the analysis and assessment of the interconnections and the accessibility of the three airports composing the Milanese airport system.

As far as concerns accessibility by road, no particular infrastructure gaps can be detected since the three airports are all located along main motorways: Malpensa is well accessible from A8 and, since 2008, also from the A4 motorway; Orio al Serio is located along the A4 motorway; Linate is located very close to the orbital motorway A51. The main weakness in the accessibility by road lies in the congestion that affects all these motorways during the peak hours. For this reason, planned road interventions are mostly addressed to provide alternative routes to the already existing ones.

Airport accessibility by rail is an important feature to improve interconnectivity between networks, but this kind of connection is not financially sustainable for all airports given the high construction costs of rail links. Nevertheless it is a fundamental precondition of those airports that aim to become a strategic international hub and in fact, out of the three airports, Malpensa is the only one with a direct rail connection.

The current weakness of the Malpensa rail connection is evident since rail services connecting airports should be always available from the railway stations that are the central point of long distance networks. This is not the case for Malpensa, whose unique rail connection ends in Cadorna station that is 5 underground stops away from the main long distance services train station in Milan.

The situation is planned to change in the future, when new connections with Milano Centrale and the HSR railway stations will be available.

Other projects are planned to improve Malpensa accessibility by rail; Figure 4-42 summarises the future connection opportunities that will be available when planned rail projects are completed.

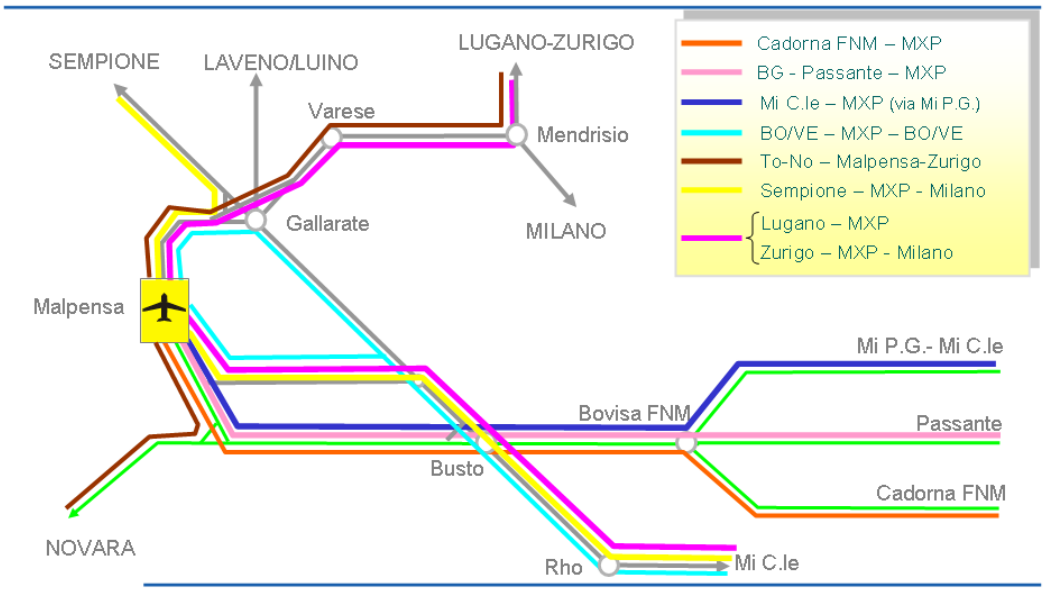


Figure 4-42 Future rail connection with Malpensa airport

Nevertheless given the general complexity of rail projects, the uncertainty about funding of interventions, and the frequent delays of execution times it is not possible to predict a real time horizon for the achievement of the final rail configuration.

The same uncertainty applies as well to other projects whose timing can be considered as indicative since most of them are still only at a planning stage.

Regarding Malpensa airport's accessibility from HSR services, the interventions planned in the midterm do not seem to guarantee an appropriate position for the airport within the HSR system. In fact, the connection to an HSR line would be beneficial for any airport, but an important requirement is that the station must have direct links to a large number of destinations with services at a relatively high frequency. In most cases this requires the airport station to be a through station on a main line where most of the services passing through it stop, and not an end-of-the-line station, or a station on a branch line from a main line (see ITS3203 in INTERCONNECT Project literature). In the envisaged solutions, Malpensa station still appears as a station on a branch line from the main line, not totally integrated with the HSR system.

All the airports have shuttle bus connections to Milan and, with a very limited number of runs, also to several other cities. Bus shuttle services connecting the three airports are also available, even if this connection between airports is a very marginal phenomenon.

Given their location close to the city centres, respectively Milan and Bergamo, accessibility by local public transport is available only for Linate and Orio al Serio airports (both by bus routes that are affected by congestion).

For many years the lack of a metro connection for Linate, the Milan *city airport*, seemed to be not a problem for the local administration: the realisation of M4 line was not considered a priority since other metro connections appeared to be of more relevance for the development of the city.

After the award of EXPO 2015, the M4 line has become one of the most strategic interventions; this is confirmed by the fact that part of the funding already allocated for the planned M6 line has been shifted to M4 realisation. Even if the benefit that Linate passengers will achieve with this new connection is clear, some confusion about its real strategic role for the city and about its completion on time for EXPO 2015 may arise.

The improvements already in the pipeline of the public administrations seem to be mostly focused on filling infrastructure gaps. Even though the completion of the infrastructures' programme is the main concern of public bodies, some other weaknesses related to passenger interconnectivity can be

detected in the current system. They are mainly related to the lack of integrated ticketing for airport interconnecting services, adequate information to users at airports and lack of check-in facilities at railway stations.

A concluding remark can be drawn from the reading of the official planning documents. It emerges clearly that, despite more than 10 years from the opening of Malpensa airport, the completion of its land accessibility is still the main issue when talking about the interconnectivity of the Milanese airport system: Linate and Orio al Serio accessibility seemed never an issue, at least until the award of EXPO 2015.

Though this can be considered somehow true for Linate, which is located in Milan surroundings, it appears less straightforward for Orio al Serio, whose accessibility from Milan and the rest of the region is mainly by road (private cars and shuttle buses). The received impression is that current planning, and planning related to EXPO 2015, does not properly focus on the growing role of Orio al Serio within the system. This seems to be also confirmed by the lack of public information on the envisaged rail connection Orio-Bergamo.

APPENDIX 1

DATA FOR MALPENSA / LINATE / ORIO AL SERIO AIRPORTS

Table 1 Linate passengers trend

Year	National	International	Transit	Total
2000	4.187.291	1.838.528	523	6.026.342
2001	4.966.987	2.168.589	761	7.136.337
2002	5.671.183	2.143.077	1.056	7.815.316
2003	6.397.777	2.358.194	1.067	8.757.038
2004	6.363.608	2.581.383	2.534	8.947.525
2005	6.594.694	2.491.305	2.608	9.088.607
2006	7.232.441	2.460.715	3.359	9.696.515
2007	7.395.635	2.528.923	1.972	9.926.530
2008	6.706.339	2.558.222	1.591	9.266.152
2009	5.833.593	2.460.246	1.260	8.295.099

Source: Assaeroporti statistics

Table 2 Malpensa passengers trend

Year	National	International	Transit	Total
2000	5.431.430	15.108.819	176.566	20.716.815
2001	4.259.899	14.201.131	109.464	18.570.494
2002	3.971.499	13.377.318	92.433	17.441.250
2003	3.863.005	13.651.745	106.835	17.621.585
2004	3.457.778	14.963.820	133.276	18.554.874
2005	3.121.155	16.378.003	131.356	19.630.514
2006	2.966.739	18.654.497	146.031	21.767.267
2007	3.089.280	20.627.897	168.214	23.885.391
2008	3.080.360	15.933.826	207.446	19.221.632
2009	3.037.904	14.311.698	202.033	17.551.635

Source: Assaeroporti statistics

Table 3 Orio al Serio passengers trend

Year	National	International	Transit	Total
2000	451.508	774.046	11.891	1.237.445
2001	367.035	679.419	10.422	1.056.876
2002	217.599	1.024.430	6.883	1.248.912
2003	286.075	2.536.775	17.631	2.840.481
2004	409.049	2.903.542	21.591	3.334.182
2005	542.149	3.784.518	25.467	4.352.134
2006	769.264	4.456.916	14.636	5.240.816
2007	847.541	4.872.938	16.613	5.737.092
2008	1.158.442	5.303.062	17.212	6.478.716
2009	1.748.303	5.395.900	13.218	7.157.421

Source: Assaeroporti statistics

Table 4 Malpensa airport parking areas and fares

PARK	TYPE	PLACES (number)	FARES 1 hour	FARES 2 hours	FARES 3 hours	FARES 4 hours	FARES 5 to 12 hours	FARES 13 to 23 hours	FARES 1 day
P1 Low-cost	unsheltered	1100	28	28	28	28	28	28	28
P2 Executive	sheltered	3300	5	10	15	20	28	28	33
P3 Express	unsheltered	800	4	8	12	16	24	24	28
P4 Long-term	unsheltered	1200	10	10	17	17	17	22	32
P5 Easy	sheltered and unsheltered	3000	3.8	6	8	8	12	18	21,8

Source: www.sea-parkandfly.it

Table 5 Malpensa airport fares for long parking times

PARK	FARES 1 day	FARES 2 days	FARES 3 days	FARES 4 days	FARES 5 days	FARES 6 days	FARES 7 days	FARES 8 days
P1 Low-cost	28	28	28	34	34	34	38	42
P2 Executive	33	61	89	117	145	173	201	229
P3 Express	28	52	95	95	95	95	95	105
P4 Long-term	32	54	85	85	85	85	85	85
P5 Easy	21,8	43	43	43	43	47	51	55

Source: www.sea-parkandfly.it

Table 6 Malpensa airport fare for week-end parking

PARK	FARE Friday to Monday
P5	30

Source: www.sea-parkandfly.it

Table 7 Milano Cadorna- Malpensa rail point to point connections schedule

Direction	Morning Schedule					
Milano Cadorna > Malpensa T1	5:00	5:30	9:30	10:30	11:30	-
Malpensa T1 > Milano Cadorna	11:03	-	-	-	-	-
Direction	**Noon Schedule**					
Milano Cadorna > Malpensa T1	12:30	13:30	14:30	15:30	16:30	-
Malpensa T1 > Milano Cadorna	12:03	13:03	15:03	16:03	17:03	18:03
Direction	**Evening Schedule**					
Milano Cadorna > Malpensa T1	-	-	-	-	-	-
Malpensa T1 > Milano Cadorna	20:03	21:03	22:03	23:03	-	-

Source: http://www.malpensaexpress.it

Table 8 Linate airport parking areas and fares

PARK	TYPE	PLACES (number)	FARES 1 hour	FARES 2 hours	FARES 3 to 6 hours	FARES 7 to 12 hours	FARES 13 to 23 hours	FARES 1 day
P1	sheltered	1300	3.8	6	11	21	28	39
P2	sheltered and unsheltered	1250	3.8	6	11	17	22	33

Source: www.sea-parkandfly.it

Table 9 Linate airport fares for long parking times

PARK	FARES 2 to 8 days	FARES 9 to 15 days
P1	60	90
P2	60	90

Source: www.sea-parkandfly.it

Table 10 Linate airport fares for week-end

PARK	FARES Friday to Monday	FARES Friday to Tuesday	FARES Thursday to Monday
P1	35	55	55
P2	35	55	55

Source: www.sea-parkandfly.it