

# Public Transport Systems Development for Urban Regeneration – Evidence from the City of Linz/Austria

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## 1 ABSTRACT

Several cities in Europe are considering large public transport infrastructure investments, some have implemented such schemes with considerable success (e.g. Barcelona, Strasbourg, Grenoble, Padova, Valencia). The introduction of such systems is a costly investment which also needs a re-organisation of the urban road network and a harmonized land development strategy in order to maximise the utility of the project. Cities therefore face many difficulties in deciding, implementing and operating such systems. However, there is a strong belief that such systems have indirect socio-economic and urban regeneration benefits, in addition to the direct transport and mobility improvements.

Apart from the direct transport and environmental benefits of new urban public transport systems, there are other advantages relating to urban regeneration, city aesthetics, employment creation, social and economic development and cohesion. The aim of the Interreg IIC project “Transurban” (Transit Systems Development for Urban Regeneration) was to examine the development and operation of such new public transport systems, through innovative strategies achieving sustainable development [VOUGIOUKAS et al, 2008].

The city of Linz, capital of the Austrian province of Upper Austria and one of the Transurban case studies has implemented a significant upgrade in its public transport network: The project included a redesign of the main railway station building and its surrounding area with combined land development (e.g. administrative buildings, shopping facilities) and infrastructure investments. Additionally the link between the region and the city was significantly upgraded by concentrating the regional bus network, the urban tram network and the regional train network at this location, settled down in a multi-storey transport interchange building. These investments created a new hot spot in the city and closed the gap between the railway station area and the medieval centre of the city. Within the project the direct and indirect effects of these investments were analysed from the viewpoint of passengers, inhabitants, investors, shopkeepers and employers. The paper will give an overview of the results with regard to the indicators discussed above.

## 2 CASE STUDY LINZ

The City of Linz with its 183 500 inhabitants is the capital of the Austrian province of Upper-Austria and in 2009 European capital of culture. The city is located at an important inter-modal Trans-European corridor between Western Europe on the one hand and Central Eastern Europe including the new member states Hungary and Slovakia on the other hand. The urban public transport system consists of innercity light rail/tram (18.9 km network length), trolley bus (18.7 km network length) and conventional bus (128.6 km network length). A demand responsive transport system completes the public transport supply. Six regional railway lines, partly light railway systems, are linking the central area with its surroundings. Apart from the reconstruction of the main station itself, the project included different measures of public transport improvements (Figure 2-1):

- Changing the inner city tram network in that way that all tram-lines have a stop beneath the railway station (underground tram link).
- Integration of the central bus-station within the railway building.
- Redesign of main railway station, optimising the interchange between regional and urban public transport.
- Holistic concept: combining investments in infrastructure with urban developments (urban regeneration, urban development and creation of workplaces).



Figure 2-1: The new railway station of the city of Linz in Austria [Zehetner, Linz AG Linien, TRANSURBAN-Workshop Linz 01.06.2006, changed from URL: <http://www.drehscheibe-linz.at> (06/2006)]

Additionally to the public transport improvements the railway station was developed as new shopping centre and meeting point. The gastro- and shopping-passage now stretches across two floors on about 5500m<sup>2</sup> floor space (Figure 2-2) [HAGER et al., 2004]. At the moment 35 companies are settled. The variety of businesses ranges from food, flowers, chemist, souvenirs and banks to car rental agency.



Figure 2-2: The gastro and shopping-passage of the station in Linz [photo by Juliane Stark]

Within the project, a survey was carried out to collect information about the travel and shopping behaviour as well as about the awareness of users of the new station. Therefore target persons of the survey were users of the public transport supply and users of the shops inside the new station. As most of the visitors of the railway station are in a hurry at the station usually, an interview date was arranged only and the telephone number was collected. The interview itself was carried out on the same day evening or the following in order to achieve valid revealed preference data [STARK et al., 2007].

### 3 FUNCTION OF THE NEW RAILWAY STATION

The results of the survey reflects the turn away from the mono functional site of the railway station as a public transport node towards a multi functional site (see Figure 3-1, multiple answers allowed). The railway station turned furthermore into a selfstanding destination for shopping, consuming of food and social contacts today. This becomes obvious as especially 22% of all visitors of they railway station did not at all use the site for changing different modes of (public) transport. About 36% of all visitors of the railway station link their presence at the station with shopping activities.

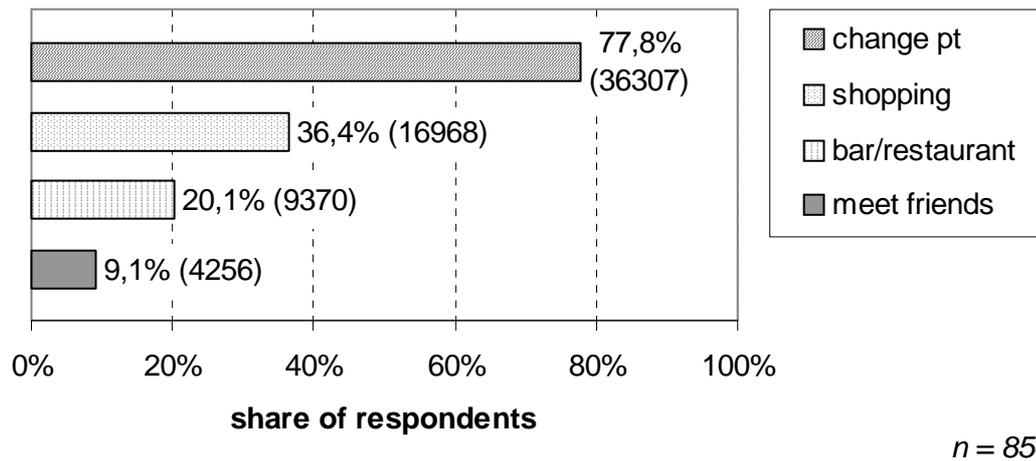


Figure 3-1: Purposes to visit the new pt node (multiple answers allowed) [own illustration]

#### 4 TRAVEL DEMAND SITUATION

Based on the answers of the survey and visitor counting before and after reconstruction [MEDOX 1999, OBERÖSTERREICHISCHE VERKEHRSERHEBUNG 2001, STARK et al., 2007], the changes of the travel demand situation could be determined. For the demand situation the framework condition were changed significantly because of the investments in the upgrade of the railway station which led into a significant change of the total number of passengers and visitors of the railway station: In total the visitor counting at the main railway station building of Linz on a workday in the year 2006 resulted in a number of 46 700 trips per day, crossing the main railway station building. In comparison to this, a count in the year 2004 (before situation) resulted in a total number of 27 600 trips per day, which means a growth rate of 70% within this time period (Figure 4-1).

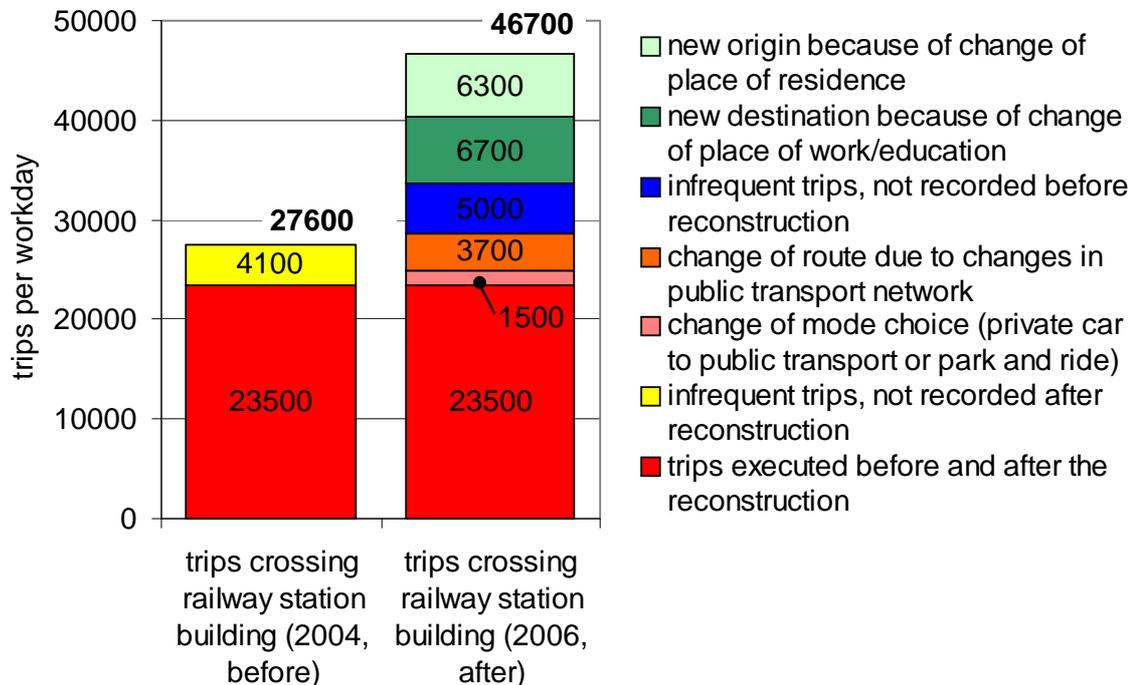


Figure 4-1: Distribution and changes of the workday travel demand of persons met at the main railway station building of Linz, before and after reconstruction [own illustration]

Because of bundling of the different modes and infrastructure, the passenger streams were affected and lengths of interchange ways were shortened (especially because of the integration of tram, light rail and regional buses into the new railway station). On the other hand, as time goes by, the demand situation was influenced by trends affecting mobility demand in general such as sub-urbanisation within the catchments

area or changes in commuter streams. 39% of the interviewed persons (equals 18 000 trips per day) stated that they did not carried out a comparable trip with the same origin and destination before the reconstruction of the railway station. Within this group 37% (6300 trips per day) stated, that a change of place of work or education was the reason of their travel behaviour. For another 34% (6700 trips per day) a change of residence caused the new situation. For both of these groups this trip is carried out regularly today. Contrary to this, 29% (5000 trips per day) of the persons stated, the current trip is unique and infrequently so that a comparison of this trip with a trip at the situation before the reconstruction is not possible. In total, for 27% of the people met at the railway station a change of their origin or destination happened within the last 3 years of time. This fact underlines the dynamic situation of the Linz conurbation. Only a minor part of the persons (1500 trips per day) changed their travel mode choice because of the new supply. Another 3700 trips have changed their trip route within the public transport mode, mostly because of changes in the public transport network due to the railway station reconstruction (integration of the tram, regional bus and light railway network).

## 5 SHOPPING ACTIVITIES

As mentioned before, the project included the creation of shops, restaurants and coffee shops with the aim to increase the quality of the location with several positive side effects such as additional revenue for the developer/owner, increasing security situation and decreasing vandalism as the station turned to a more frequently used place. The biggest share of the interviewed persons met at the railway station building who stated, they have bought non public transport related goods or services at the station, visited the supermarket (45%), followed by coffee shops and restaurants (together 42%). All of the other services or shops are visited less frequently (Figure 5-1). 67% of the interviewed persons stated, they have spent some money at the station because of the convenient possibility. Otherwise they would not have spent this money for this purpose. Within the group of persons, who have changed their destination choice for shopping, the biggest share bought these goods in the city centre of Linz before the reconstruction of the railway station building (59%).

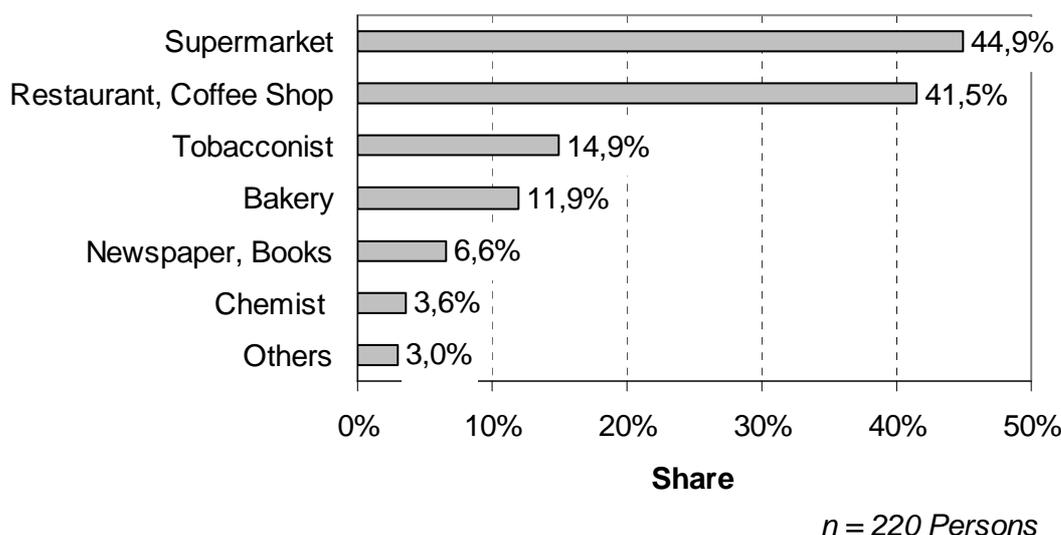


Figure 5-1: Distribution of non public transport related goods or services, visitors of the railway station building have bought (multi answers included, workday situation 2006) [own illustration]

Additionally to the shopping behaviour the duration of stay was surveyed, the average time period is 26 minutes. With 56%, the biggest share of visitors stayed less than 15 minutes at the railway station. The (partly non voluntary) duration of stay is the main argument for shopping activities at the station (52%). Figure 5-2 shows the average duration of stay grouped by different “types” of visitors: Those persons, who did only use the railway station to change the traffic mode stay only 19 minutes on average, whereas those who additionally carried out some shopping activities stayed 28 minutes on average, those who visited a restaurant or coffee shop stayed 44 minutes on average. There is no information of the share of visitors who have actively expanded their stay at the station because of the activities carried out there and about those who have only used the existing waiting time for the next transport mode.



Figure 5-2: Average duration of stay of visitors of the railway station building of Linz, grouped by activities at the station, workday situation 2006) [own illustration]

The average amount of those visitors, having spent some money for non public transport related goods or services at the railways station is € 9.80. Public transport related goods, such as purchase of tickets, seat reservation, parking fees are not included in this figure. Crossing up this amount, the average revenue for shops and services at the railway station is € 180000 per workday.

## 6 SATISFACTION AND DISSATISFACTION WITH REGARD TO THE INVESTMENT

Allowing open answers, users were asked what they like regarding to the new railway station (Figure 6-1). Nearly two third of the respondents pointed out, that they like the modernisation of the building and up to 41% its upgrading to a multi functional building. What means, those people are very aware of changes, the project mainly aimed at apart from the upgrade of the public transport supply. Technical solutions as the integration of the tram station (5%) or the new guidance systems (3%) are recognized at a much lower level. Users of the station do not like (Figure 6-2) aspects on general project level (e.g. bad alignment of public transport stops or design and architecture, both 4%), but much more on a very detailed level (e.g. too less ticket selling points 7% or too few benches and waiting areas 6%) or related to social aspects or organisational issues (homeless people at the station 32%, fee for toilet 20% or working hours of shops/services 9%). That leads to the conclusion, that in principle the users are satisfied. Dissatisfying things can be either improved with low extra costs (additional ticket vending machines, more benches) or need to be solved outside any constructive solutions (change of regulations concerning the legal working times of shops, solving the problem of homeless people). If these issues are considered in a future redesign of the railway station it is important to communicate these changes after their implementation, because most of the actual and potential users already created themselves an image of the new railway station after its opening and perhaps they are likely to overlook any changes/improvements as they may be less obvious compared with an opening of a new railway station building.

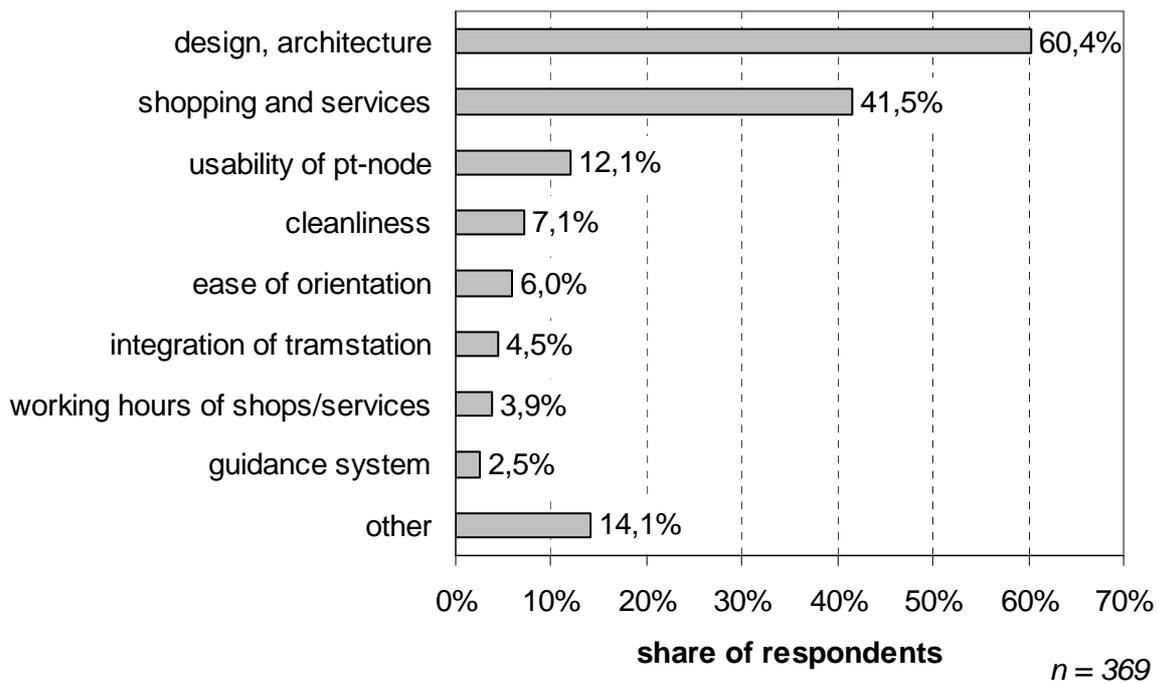


Figure 6-1: What respondent do like at the new public transport node (multiple answers possible) [own illustration]

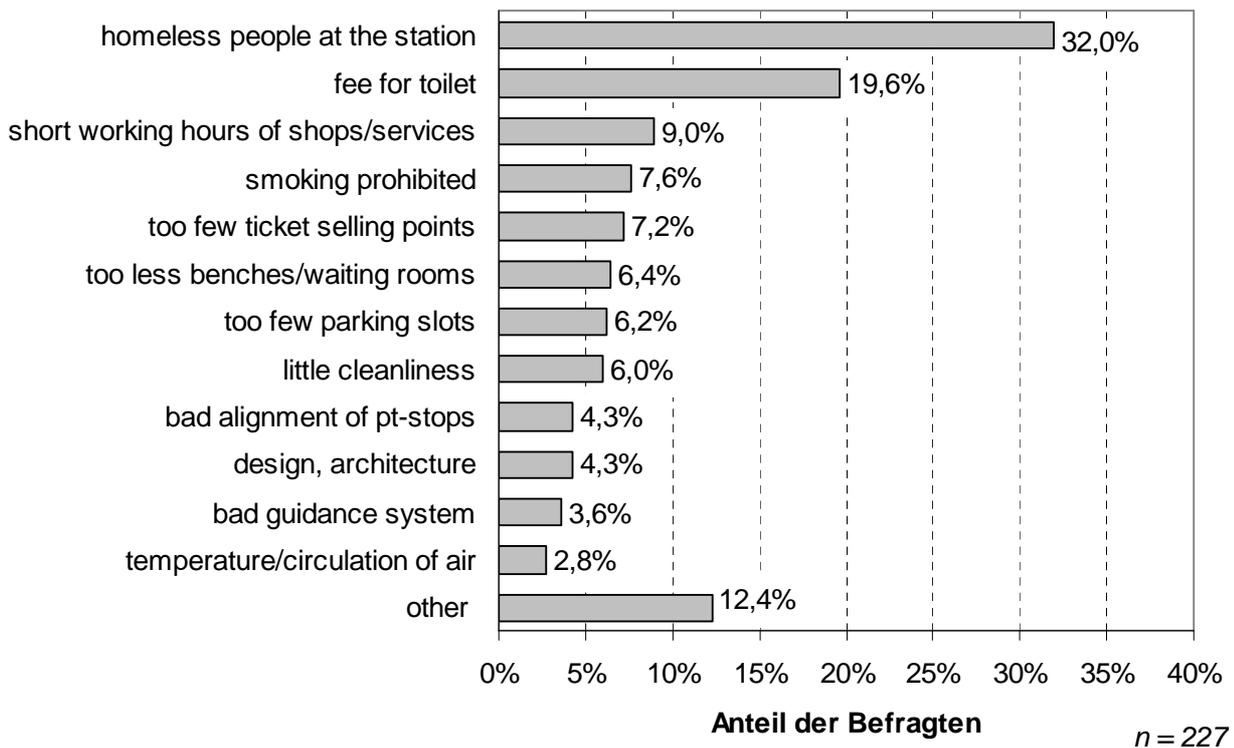


Figure 6-2: What respondents do not like at the new public transport node (multiple answers possible) [own illustration]

Apart from the results of the survey discussed above, direct suggestions of the users were collected, how supply could be further improved. In Figure 6-3 the answers were categorised into equal types of answers. Suggestion concerning the area surrounding the new rail way station building form one of the biggest groups (22%). As the urban regeneration process in this area is not completed now and several constructions sites still disturb the users, an improvement of the situation can be likely expected in the near future. At a similar level the presence of staff at the station forms another big issue (23%). Of course it is a matter of costs to increase the number of staff. However increasing visibility of the existing staff could be a possible solution by shifting work places from hidden offices towards places with intervisibility to the visitors of the station. Improving functionality and accessibility of the public transport node are of similar

importance for the users, perhaps a solution could be found with small measures as in principle the majority of the users is very satisfied with the outcome of the project (compare with Figure 6-1).

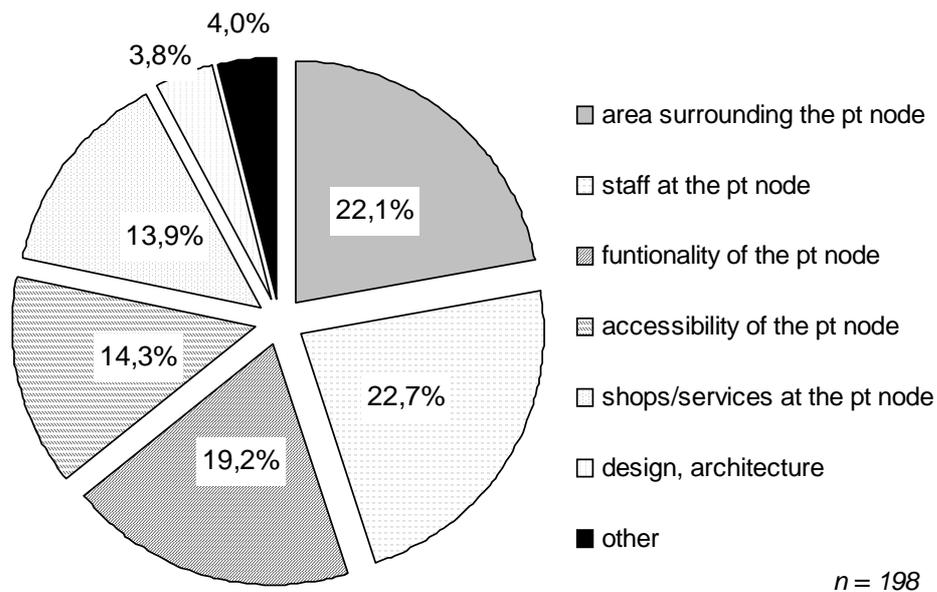


Figure 6-3: What respondents would like to improve at the new public transport node [own illustration]

### 7 COMPLEMENTARY INVESTMENTS WITHIN THE QUARTER

Within the research project semi-structured expert interviews were carried out with investors, project developers and shop owners as well. The target group of these interviews can be split into three different groups according to the location of their activities: (1) investments/shops directly integrated in the railway station building, visitors can access weather protected (2) investments/shops within 5 minutes walking distance from the railway station building. This area is located in the Northern part of the railway station only, all surface access points are connecting this area with the railway station. (3) investments/shops in the Southern part of the area, with no direct access to the railway station building (no entrance to the station because of technical obstacles, such as engine and coach maintenance areas, depots of the railway company). This area is accessible via the tram lines beneath the railway station building, usually within a time margin of 5 minutes as well. Nevertheless the demand of visitors is clearly smaller, casual customers are of a minority in this area.

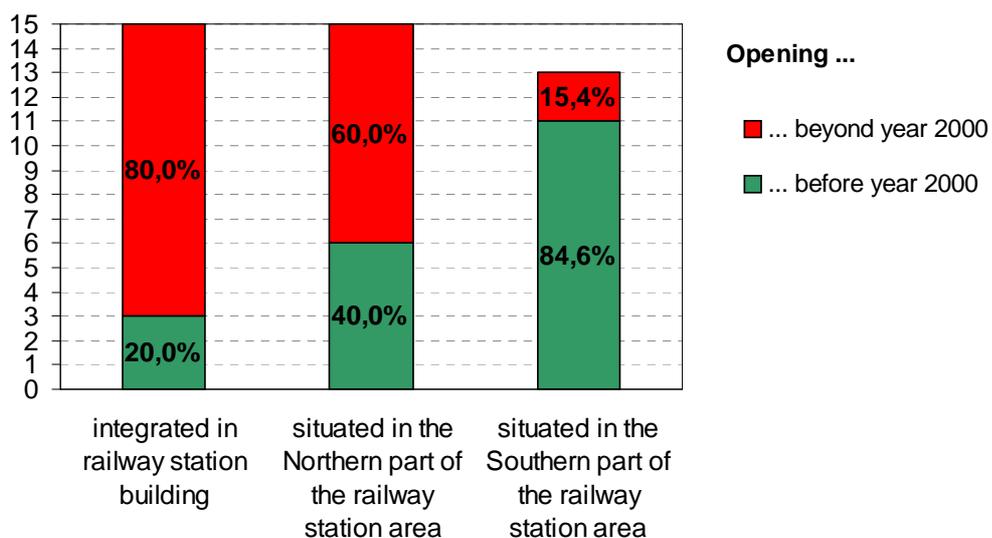


Figure 7-1: Opening year of enterprises, segregated after different sub-areas [own illustration]

Independently of location of investment/shop, interviewed persons agree to the fact, the developments including the railways station reconstruction and the restoration of its surrounding area caused a remarkable

and dynamic development in the whole area. The demand for constructed office rooms and shops is satisfying for the developers. Survey results shown in Figure 7-1 underline this statement, especially in those areas with good walking access to the new project. These results confirm the relation of quality of location and land development. Feedback on the developments in the area is marked as a positive development for the majority of the respondents. Nevertheless, only a minority of interviewed decision makers with investments/shops located outside of the railway station building stated, their site decision was influenced by this investment. Within this group, the answers were different between the areas located in the Northern and Southern part of the railway station area (Figure 7-2), with a clear correlation of distance to the railway station building. No employment effect could be examined in those shops/offices already existing before reconstruction work started, which could be traced back to these investments. An increase of clients was noticed by 15% of the owners of shops or offices with client contacts at site. Contrary to this development, owners of shops and offices with client contacts at site located at the area Wienerstraße and Unionstraße (Southern area), where the tram was realigned below surface level were complaining a loss of clients. Those owners of shops/offices integrated in the railway station building are generally satisfied with the client demand and their economic situation (80% of owners).

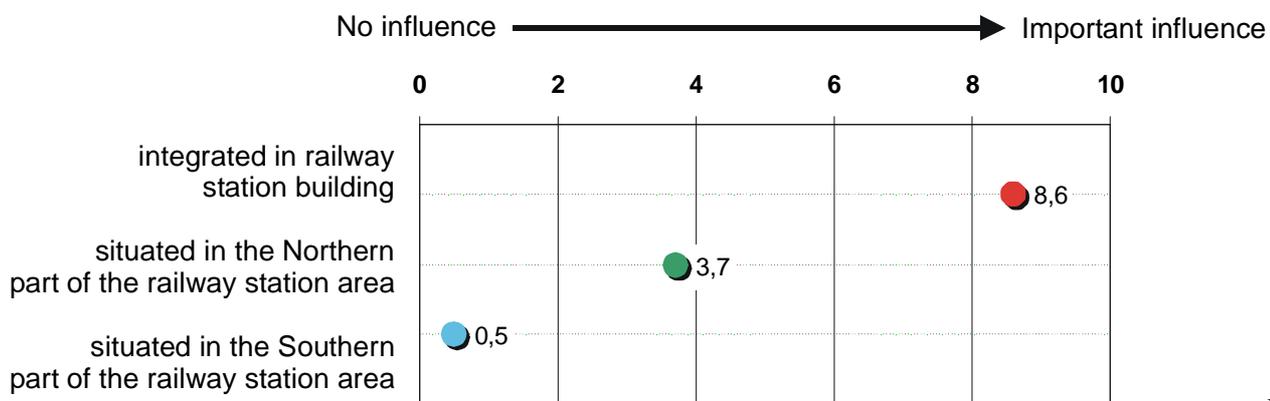


Figure 7-2: Influence of the reconstruction of the railway station area in Linz towards the decision to locate the investment/shop at this area, segregated after different sub-areas [own illustration]

Table 7-1 summarizes the main projects within the area investigated, segregated after transport and non transport related investments. As the table shows the ratio of non transport related investments is three times higher in comparison to the transport related investments, even if one focuses on the main investments only. A lot of further investments - but of a smaller scale - were recorded in the area during a site visit but not crossed up to an investment sum (Figure 7-3). A major problem, if analysing these developments is to determine causality within the cause and effect chain. Developers are clearly benefiting of the infrastructure upgrade, but in tendency denying the influence towards their decision to invest/settle down or not. On the one hand, the availability of land to develop and the actual land use plans are further main drivers of developments. On the other hand, investors want to avoid to start a discussion about implementing a beneficiaries tax to be paid by land developers to the public investor (as cases exists already, e.g. in Madrid conurbation, tram of Valdemoro case or Cambridge, guided busway case). For a cost benefit analysis, the estimation of the third party effects is difficult, especially as these effects are of great potential to influence the results and therefore the decision making.

Table 7-1: Main investment projects in the quarter of the railway station [own illustration]

	Project	Investment sum	Work-places	Opening date
infrastructure investments	Linz railway station	~ 43 Mio. €	150	12/2004
	Integration of light railway (LILO)	~ 47 Mio. €		12/2004
	Integration of tram	~ 70 Mio. €		12/2004
	<b>total</b>	<b>~ 100 Mio. €</b>	<b>150</b>	-
Other investments	Provincial administration centre (LDZ)	~ 140 Mio. €	~ 1800	2005
	Tower of knowledge (library)	~ 31 Mio. €		07/2007
	Head office of regional energy supplier Energie-AG (Power Tower)	~ 37 Mio. €	~ 600	09/2008
	Administration building chamber of labour	~ 30 Mio. €	~ 400	10/2008
	Terminal Tower (office building)	~ 50 Mio. €		03/2008
	<b>total</b>	<b>~ 288 Mio. €</b>	<b>~ 2800</b>	-

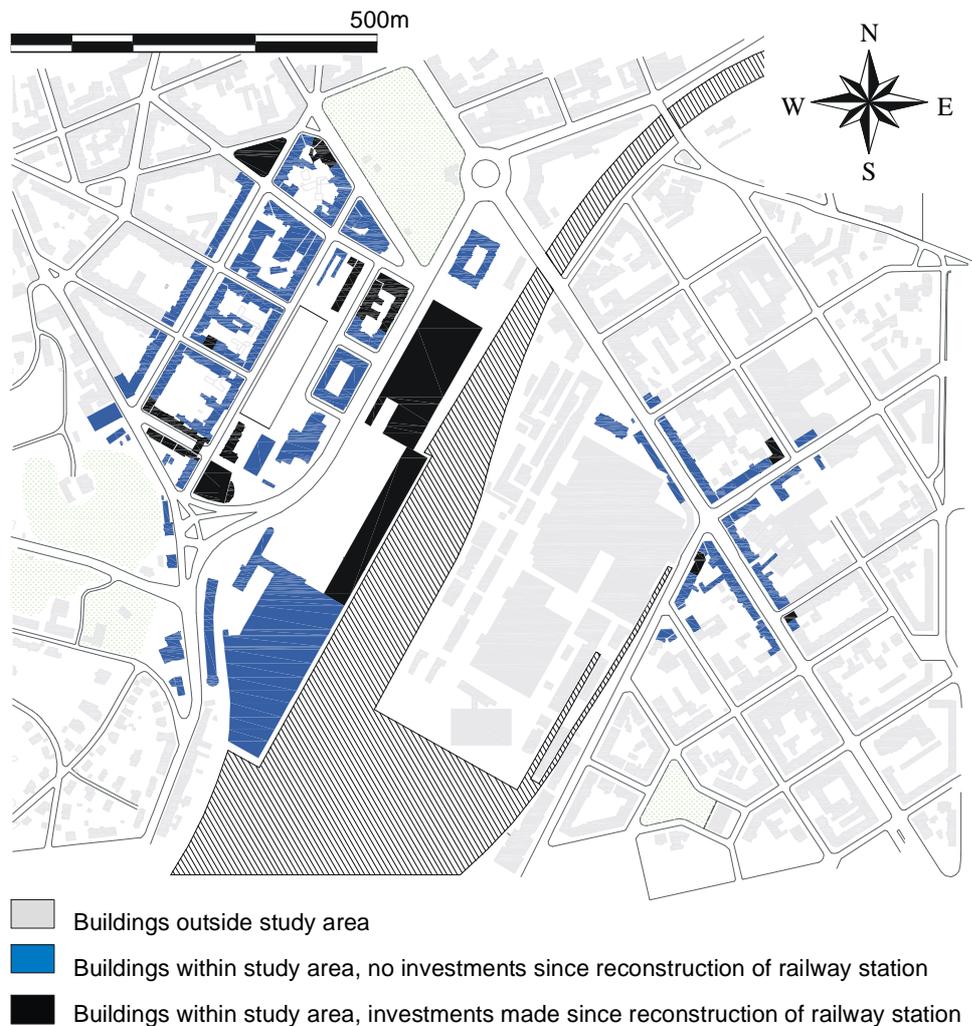


Figure 7-3: Spatial distribution of investments in the main railway station quarter Linz [own illustration]

## 8 CONCLUSIONS

Because of the reconstruction of the new railway station area in Linz, the number of travellers could be increased significantly within a very short time period. Beside this, the investment included a functional transfer of the railway station towards a multi functional location with lot of non transport related shops and services. Therefore the station building becomes a self standing destination for trips for a part of the visitors. As meanwhile state of the art, a high quality transport node should be designed attractive for convenient use of the public transport network and should host commercial uses with different types of shops and services to make use of synergetic effects at site. In such case actors involved like visitors, transport operators, shopkeepers or other investors mark such projects generally very positive. Under this light, the reconstruction of the railway station building in Linz / Uppert Austria and its neighbouring area can be named as a successful implementation. Any further improvement of the public transport network accessing the transport node is able to contribute to a maximum effectiveness of the project. And such improvements are planned as additional projects are currently under investigation or already decided. Especially by establishing a S-Bahn system, an upgrade of the existing railway network on the main routes is foreseen on its Western, Northern and Southern corridors [AMT DER OÖ. LANDESREGIERUNG, 2002]. Further projects are [ERNST BASLER+PARTNER, 1999, HÖFLER et al., 1996, PROGNO AG. 1995]: (1) extensions of the tram network towards quarters and settlements with a very dynamic development (communities Leonding, Pasching and Traun), which will increase the catchments' area with direct link to the main railway station (2) integration of an additional regional train to the main railway station (Mühlkreisbahn). All these improvements will further increase the demand and intensify the usage of the transport node. The concept of these nodes already considered these developments with sufficient capacity to accommodate these additional visitor and passenger streams at site.

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