

<b>Central European Regional Policy and Human Geography</b>	Year III, no. 2, <b>2013</b> , pp. 15-29.
HU ISSN 2062-8870, HU E-ISSN 2062-8889	Article no. 2013-14

## **TRANSPORT CONNECTIONS AND LOCATION CHOICE OF INDUSTRIAL PARKS AND THEIR ENTERPRISES IN HUNGARY**

**Éva KISS**

Scientific advisor, Geographical Institute, Research Centre for Astronomy and Earth, Hungarian  
Academy of Sciences, Budapest, Hungary  
University Professor, Faculty of Economics, West Hungarian University, Sopron  
E-mail: kiss.eva@mta.csfk.hu

**Tibor TINER**

Senior research fellow, Geographical Institute, Research Centre for Astronomy and Earth, Hungarian  
Academy of Sciences, Budapest, Hungary  
E-mail: tiner.tibor@mta.csfk.hu

**Abstract:** After the change in the political and economic systems relevant changes have taken place in the Hungarian industry and its location choice. Based upon two surveys the main purpose of this study is to reveal the role of transport endowments and different transport networks in the location choice of industrial parks and their enterprises. The research has clearly demonstrated that the main attraction for industrial establishments is the good conditions for road transport, especially the routes of motorways. It has also become obvious that there is a close correlation between the main indicators of industrial parks and the quality of their transport infrastructure. Transport connections have had a great impact on the development and spatial pattern of Hungarian industry.

**Keywords:** industrial parks, transport, accessibility, Hungary

\* \* \* \* \*

### **INTRODUCTION**

Industrial parks forming the new scenes of industrial production have already appeared in Hungary in the beginning of 1990s, but their number started to increase at a very rapid pace only from 1997, because the new governmental development program for industrial parks was introduced at that time (Kiss, 2010). In fact, that, where industrial parks were established, has depended on numerous factors. Of which, the most important ones are the development of transport infrastructure and the running of different transport networks. At least, this was our starting hypothesis that was attempted to examine from closer within a four year OTKA (National Scientific Research Fund) project (project number K 75906) (Kiss and Tiner, 2012). And the experiences of this research are summarized in this study based upon the presentation which was delivered on the 6<sup>th</sup> Hungarian Geographical Conference, and which was selected as the best one of its session.

In the course of the research three basic purposes were set up, which are the followings:

- to reveal the relation between the more important features of industrial parks and their transport connections, with particular regard to top 500 firms and industrial parks of less developed counties,
- to analyse the role of transport infrastructure in the location choice of industrial parks,
- to examine the relationship between the transport requirements of firms settled down in industrial parks and the transport endowments of industrial parks.

The results of a questionnaire survey carried out in two phases make possible replying to the questions. First, a survey was carried out in the circle of industrial parks. In this case the questionnaires containing 19 questions were sent to all industrial parks, but only one third of them (72 industrial parks) answered the questions which can be considered a fair rate, particularly if we also take into consideration that 10-20% of industrial parks did not operate (Kiss, 2010; Regós, 2007). One part of the questions of the questionnaires referred to the main features of industrial parks (e.g. the year of foundation, the size, the type of investments, the number of enterprises and employees). The other part of the questions referred to the transport geographical connections of industrial parks. In the interest of accuracy, it is necessary to mention that not each question was responded by each industrial park. There were such questions which were not replied because of some reason by one or more industrial parks.

The second survey was carried out in 2011 after working up the first survey. During this year 23 industrial parks with balanced regional distribution were chosen for further investigations from the 72 industrial parks classified into different groups in 2010. 83 so-called "transport intensive" companies situated in those 23 industrial parks were selected in a way that each NUTS-2 region of the country was represented by 3-4 parks. The suitable level of transport connections is of great importance for the firms aiming rapid access both to domestic and international markets.

The investigation of transport intensive firms was made by questionnaires containing 21 questions. The most important questions referred to the year of foundation, the profile of the firm, the ownership structure, the number of employees, the transport position of industrial parks inside the transportation network, the network links and the accessibility of network nodes for industrial parks within the transportation system, the level and the condition of transport infrastructure inside the industrial parks, the reasons for settling in these parks, the volume and the seasonal waves of input-output flow of production of the firms, the place of origin of the input and the destination of the output.

In the course of both surveys the number of respondents seems to be low, but it has to be considered that it is very difficult to get any kind of information or data from industrial establishments. In most cases they did not reply to any question because of business secrets. In spite of this, we think that the available answers made possible to execute the aims set up.

Besides the two surveys mentioned above we also analysed the spatial pattern of top 500 firms by revenue and profit as we supposed that the quality of transport network and transport infrastructure also had an impact on their spatial distribution and position. Using the data of Creditreform made possible to demonstrate the changes between 2005 and 2009 in the ranking of the top 500 firms settled in the industrial parks of modestly and weakly developed counties (Creditreform, 2010ab; Tiner, 2010ab).

This study consists of four major parts. After the short introduction we analyse the role of transport in the location choice as the theoretical background of the research. In the next part the major characteristics of industrial parks are summarized. Then, the results of the survey carried out among industrial parks in 2010 are demonstrated and finally, the major consequences of the survey carried out in 2011 will follow before the conclusions.

## SOME CONNECTIONS OF THE LOCATION CHOICE AND TRANSPORT

Until the middle of the 19<sup>th</sup> century the issues of location choice of industrial establishments did not arise, because at that time the movement of means of production was quite limited (Kozma, 2003). The turn took in the second half of the 19<sup>th</sup> century when the achievements of industrial revolution gained larger and larger ground, national states were established and the railway building prospered. The spatial structure of railway network and its junctions had a great impact on the economic development and industrial location choice, which resulted in dynamically developing industrial belts along the main railway lines. Railways played a leading role in the process of industrialization and in the establishment of new industrial sites or in other words in the location choice of new factories and workshops. The railway construction had a favourable impact on the industrial development in Hungary too. The most frequently the main railway lines attracted the new industrial locations and thus they became the axes of economic development, where relevant economic (industrial) centres appeared.

In the 20<sup>th</sup> century the technical development of transport, the appearance of passenger cars had a revolutionary impact on overland transport. The shift from the railway era into the motorway age was much slower in the Eastern part of Europe than in the Western one, where this process accelerated only in the early 1990s after the political regime change. Consequently, the inequalities in the branches of transport between the Western and the post-socialist countries have considerably diminished by now. During the last decades the considerable increase of the length of public road network in Hungary and the favourable change of its quality have also contributed to this. Between 1990 and 2013 the total length of motorways and motor roads extended from 349 kilometre to about 1500 kilometre. Nowadays they miss only from four counties (Békés, Jász-Nagykun-Szolnok, Nógrád, Vas). In each of them – except for Vas county – the intensity of (re)industrialization has grown to a more modest size after 1989 compared to the Northern part of Transdanubia, and the foreign capital did not show any interest towards them either. This also indicates that transport connections and accessibility still play an important role in the location choice. Though, during the last one and half century the viewpoints and the issue of location choice have also gone through marked changes.

In the beginning of the 20<sup>th</sup> century the minimization of transport costs was considered the most important aim in the location choice. The first location theories also strove for this. Later, parallel to the building out of transport network and to the transport technical development the accessibility of each region or settlement has got better. Relevant time-space convergence has taken place, which has gone together cost-space convergence (Kozma, 2003). The considerable decrease in transport costs has involved their decreasing role in the location choice. In the 21<sup>st</sup> century, however, in the strongly globalized world economy facing with numerous challenges the importance of transport costs can also increase, which can be connected partly with the economic crisis broken out a couple of years ago and partly with the increase of energy prices.

Nowadays the issues of location choice in industry are already rather complicated and it is very difficult to determine the exact role of each factor (Kiss, 2010). But it is unquestionable that subjective factors have got larger and larger attention instead of objective factors making the not simple location choice more difficult.

During the socialist era there was not a real location choice in Hungary like in other socialist countries, because the decision on the location of a factory or a plant was made by a “top-down” way. Consequently, the natural, social and economic factors of the given place did not or could not play a more special role in the location choice, namely where a new factory to

be established. Due to this the transport endowments and the quality of transport connections were not important either. This can be traced back primarily to the transport network, mainly to the underdeveloped motorway network and to that transport costs were very low. They had only a marginal influence on site selection criteria on the large industrial investments (Barta and Enyedi, 1981).

After the change in the system relevant changes have taken place in the location choice of Hungarian industry, which can be explained by passing on the market economy, by the increasing number of industrial actors, by sharpening competition and the effect of global economic processes. In consequence of all these the circle of factors playing role in location choice and the importance of each factor have also been modified. After 1989 not only the importance of geographical location has increased but also the accessibility of each place, each site. Particularly, these factors played an outstanding role in the site selection of foreign investors. The accessibility is closely connected with the development of transport infrastructure which also went through significant development during the last decades. This can also result in in Hungary and other post-socialist countries as in developed western countries that the influence of transport infrastructure will be pushed into the background (Bodor, 2001). The results of our four year research project have also confirmed this. At the same time other factors (for example: qualification of labour force, development of infrastructure) will have a relevant impact on the decisions of location choice in the future too.

## **MAJOR CHARACTERISTICS OF INDUSTRIAL PARKS SURVEYED**

Nearly two third of the industrial parks (72 altogether) taken part in a survey made in 2010 were established before the turn of the millennium. Since a long time has passed since their establishment, there has been an opportunity to build up the infrastructure of their communication and strengthen their connections of transportation. The rate of the industrial parks established between 2001 and 2005 and after 2005 are nearly the same. The answers of the 72 industrial parks reflect well the distribution of all industrial parks by the year of their establishment. Nearly half of them were established in 1997 and 1998 so they belong to the group of older industrial parks (Figure 1).

Due to the increase of industrial parks after 1997, their spatial pattern became more even, although the spatial distribution of the respondents is uneven. Mainly they were concentrated in Central Transdanubia, in Central Hungary, in Northern Hungary and the Great Plain, while the other parts of the country were represented by less industrial park. This disproportion is attributed that almost two thirds of industrial parks are situated to the north of the Miskolc-Kaposvár line with SW – NE direction.

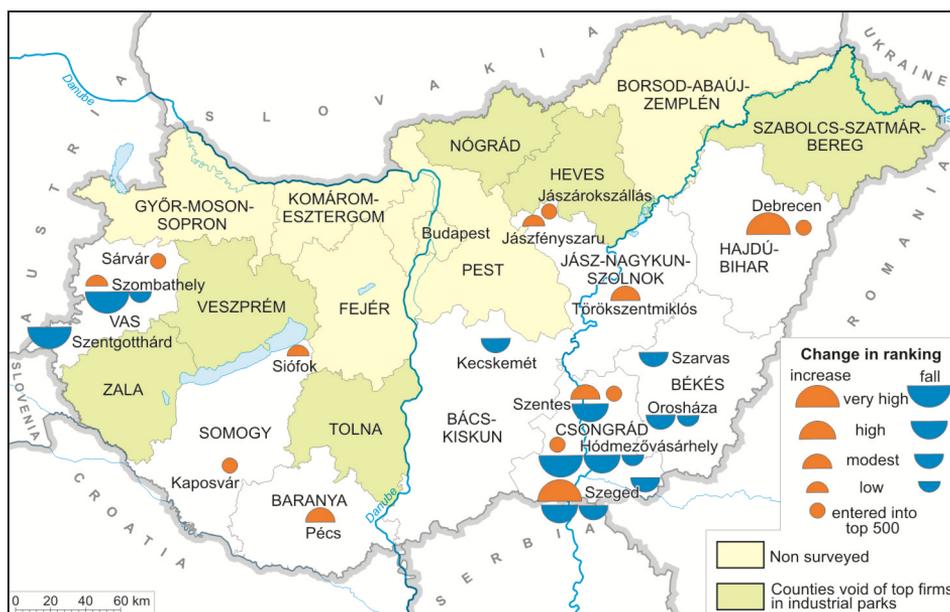
According to the character of investments, industrial parks can be categorized into three main types: greenfield, brownfield and mixed ones. 28 of 72 investigated industrial parks were the result of greenfield investments, further 32 industrial parks were brownfield ones and the rest of them belonged to mixed type. In the location choice of industrial parks many factors are weighted by experts. Their decision is also influenced by the type of investment of industrial parks. In case of greenfield industrial parks, their enterprises mostly have a possibility for the realization of the most favourable transport connections and other service infrastructure (e.g. parking places) for them. As a consequence they can have a great impact on the shaping the transport network within industrial parks in order to be the most useful and economic. They also have a larger possibility for the real choice of their location. Thus, their transport connections meet their transport requirements the most. In contrast, brownfield industrial parks have to face with more limited possibilities and they have less freedom to form their already existing transport infrastructure. The firms settled in the



Tatabánya Industrial Park – 5,600 persons; Győr Industrial Park – 4,554 persons; Hatvan Industrial Park – 4,247 persons and Nyíregyháza Industrial Park – 4,000 persons). The smallest number of employees worked in Almásfüzitő Industrial Park (30 persons), Barcs Industrial Park and Polgár Industrial Park (40–40 persons).

In the Hungarian industrial parks several thousand (in 2010 almost 4,000) firms are located. Many of the top 500 firms of the country by revenue and profit are also located in industrial parks. There is no doubt that their good position is closely connected – directly and indirectly – with their excellent transport geographical location and good transport connections. This can be also a reason why the Central Hungarian region concentrated 45–61 per cent of top 500 firms between 2005 and 2009. Its share of profit and revenue is still high (Tiner, 2010a). During the last years the changes in the profit and revenue reflects heavy concentration into Budapest and its agglomeration zone, the “superhub” region with the most developed transportation network.

Surveying the location of firms operating or producing in the industrial parks of more modestly or weakly developed counties and belonging to top 500 by their annual revenue revealed that their number is very low, i.e. merely 28 (38 per cent) as the total number of firms located in this group of counties was 74. Among them considerable regional inequalities can be found (Tiner, 2010b). A closer examination of the data makes clear that 14 top firms have lost their position in ranking between 2005 and 2009. The average position loss exceeded the value of –73. Only 7 companies have managed to get higher position in this period, but this step was not spectacular (their average win has reached + 46 only). Further 7 firms managed to join to the club of top 500 between 2005 and 2009 (Figure 2).

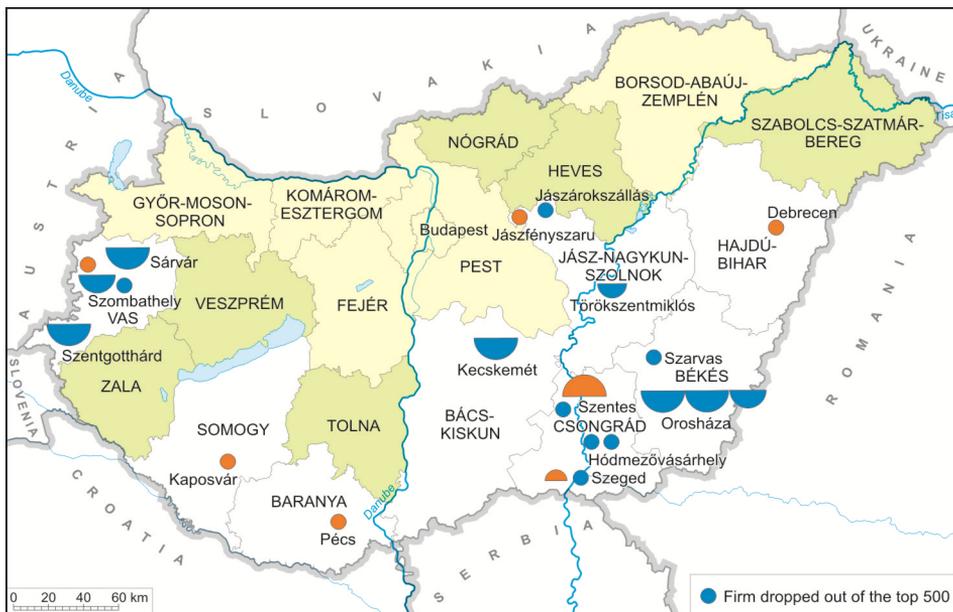


**Figure 2** Tendency and the rate of change in the ranking of the top firms settled in industrial parks of modest or less favoured counties by their annual revenue in Hungary (Edited by Tiner, T. 2010)

Source: Creditreform, 2010a

The regional pattern of winners demonstrates the relatively good position of firms located in the industrial parks of the counties belonging to Northern Great Plain Region and partly in Southern Transdanubia. The losers are mainly concentrated in the counties of Southern Great Plain region with few exceptions (e.g. ContiTech Rubber Industrial Ltd., Szeged; Legrand Hungary Co., Szentes) and in Vas county within Western Transdanubia Region.

When the profit of these firms accommodated in industrial parks is investigated the picture seems to be mixed. Firstly it can be stated that among the firms located in industrial parks of the 14 modestly or weakly developed counties and belonging to top 500 by their profit only 22 are profitable. The total number of firms belonging to this group of counties is relatively small (only 86). The rate (22 to 86) is an unfavourably low (26 per cent), marking a low economic efficiency of top firms located in industrial parks of the 14 sample counties (Figure 3).



**Figure 3** Tendency and the rate of change in the ranking of the top firms settled in industrial parks of modest or less favoured counties by their profit in Hungary (Edited by Tiner, T. 2010)

Source: Creditreform, 2010b

The regional pattern of these 22 firms demonstrates the falling of profit of the top firms located in industrial parks of the 14 counties. Their substantial part (9 per cent) belong to Southern Great Plain Region (with a concentration in Csongrád and Békés counties), a smaller group (4 per cent) to Western Transdanubia (Vas county). Tendency of change in the case of the firms located in Northern Great Plain Region and Southern Transdanubia seems to be positive, but the size of this group is unfavourably small. As we see later these are mainly those counties where the transport connections are not so favourable, where motorways still miss. Besides the unfavourable transport endowments the economic crisis also contributed to this (Kiss, 2012).

About 50 per cent of the available area is occupied by firms in more than two thirds (70 per cent) of industrial parks which seems to be a very favourable rate. It means that the major part of their area is in permanent use. Less than 50 per cent occur only in case of a few newly (a few years ago) established industrial parks in Northern Transdanubia and Northern Hungary. Industrial parks with occupation rate of 25–50 per cent operate mainly in the Great Plain regions. The largest differences between industrial parks with high and low occupation rates are demonstrated along the Miskolc-Kaposvár line. The majority of industrial parks with high occupation rates are located to the North of that hypothetical line. The main part of industrial parks with low occupation rates is concentrated to the South of that line (especially in the Great Plain regions).

It must also be emphasized that the occupancy itself doesn't reflect, neither the profile and the profitability of located firms, nor the (capacity) utilization rate of industrial parks. Starting from this statement, there should be remarkable differences between the industrial parks settled in the Northern parts of the Transdanubian region and the ones settled in the Southern parts in spite of the fact that the occupancy rates are high in both regions. Different transport capabilities have undoubtedly had an influence on it.

## THE EXPERIENCES OF THE SURVEY 2010

Observing the spatial structure of industrial parks it can be seen well that the majority of them are settled along the motorways. Nearly half of them are located closer than 10 kilometre to those arteries. So the closeness of motorways is a basic condition of the existence for the operation of industrial parks. Areas having good motorway connections are on the map of foreign investors and this way they are doomed to development.

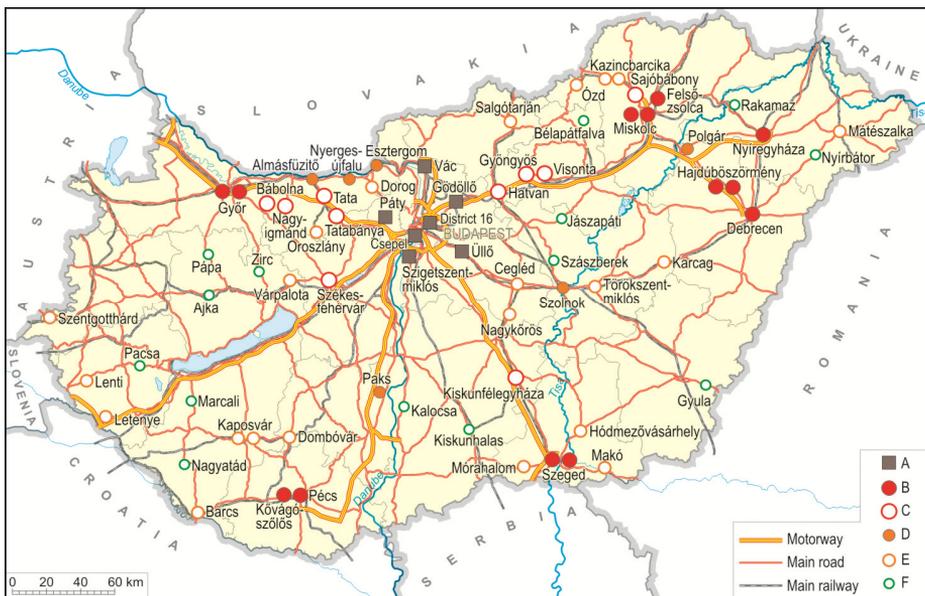
The need for favourable accessibility via motorway is various in the different branches of economy. Transport capability is very important especially for the processing industry, mainly for machinery industry (automotive industry, electronics), because many of their inland factories being subsidiaries of transnational companies are in close contact with the global networks of production.

A close correlation can be detected between the routes of motorways and the spatial distribution of industrial parks, mainly in the agglomeration zone of Budapest and along the motorways: e.g. along the M1 on Northern Transdanubia, M3 in Northern Hungary and Northern Great Plain, M5 in Southern Great Plain, M6 in Southern Transdanubia and finally along M7 in Central Transdanubia NUTS2 regions. Closeness of motorway is the dominant element of typifying in case of industrial parks by their position in transportation network (Figure 4).

Main features of industrial parks in different transport position are the following (Kiss and Tiner, T. 2012):

– The existence of industrial parks close to M1 motorway (e.g. Nagyigmánd, Almásfüzitő, Nyergesújfalu Industrial Parks) with low rate of occupation confirms the hypothesis that additional factors (e.g. favourable demographic structure, skilled labour force) are also necessary to enhance the positive effects of a motorway. Probably, those additional factors contributed to a relatively high occupation rate even in industrial parks (e.g. Videoton Industrial Park in Kaposvár, Gyula Industrial Park, Barcs Industrial Park) being more than 50 kilometre away from the nearest motorway. Since the majority of the industrial parks mentioned above are brownfield investments, their connection to motorways is not a decisive factor for their activities, as only few enterprises could have settled in in these industrial parks which have close connections to global economy. Only Gyula Industrial Park (Békés county) out of the surveyed 72 industrial parks informed us about the fact that its distance from the nearest motorway was more than 100 kilometre. Obviously, it is not a coincidence,

because transport geographical position of Békés county is very unfavourable. Even these days there is no motorway in Békés county (though its construction has been already started). – The closeness of industrial parks to primary and secondary roads contributes to their relatively good road accessibility. Altogether 19 industrial parks revealed that their distance from the nearest primary or secondary roads is more than 10 kilometre. Their regional distribution generally follows the structure of periphery areas of the country, namely they (e.g. the Barcs Industrial Park, Letenye Industrial Park) can be found on the outer peripheries along the border regions and on inner peripheries along the county borders (e.g. Bélápátfalva Industrial Park, Makói Industrial Park, Szászberek Industrial Park). In other words, industrial parks with poor road accessibility are situated out of the Northern Transdanubia region which has the most developed industry after 1989. Northern Transdanubia is a pioneer in the industrial innovation and its integration into the global economy is the most accelerated).



**Figure 4** Six types of industrial parks by their positions in transportation network in Hungary, 2010 (Edited by Tiner, T. 2011)

Legend: Industrial parks in a multimodal transport location connecting to “superhub” Budapest (A). Industrial parks situated along main transport arteries near important river ports and/or airports (B); along main transport arteries without neighbouring river ports and/or airports (C); along secondary arteries near important river ports and/or airports (D); along secondary arteries without important neighbouring river ports and/or airports (E); along tertiary arteries (F)

Source: survey carried out in 2010

– The connection of industrial parks to railway lines – except Letenye Industrial Park, Várpalota Industrial Park and Visonta Industrial Park – seems to be favourable, because the majority of them can reach railway lines in their settlement and within a few kilometre distances. Mainly double- and single-track electrified main railway lines are available for

industrial parks. However, the utilization of this advantageous condition is far from the optimal, because of the lower attraction of freight and passenger rail transport. Consequently, railway connections do not play an essential role neither in location choice of industrial parks and their enterprises nor in their further development. Generally, Hungarian experiences are in accordance with the international trends, in fact, they follow them.

– As for the water transport, we can state that most of the industrial parks are in unfavourable position, because the majority of their sites are far from the ports of our navigable rivers. Industrial parks situating in hilly regions with traditional industries are in the worst position. One sixth of the surveyed industrial parks announced that the nearest river ports are less than 20 kilometre away from them and they are situated along the Danube and Tisza Rivers. The water transport connections are also determined by the routes of the navigable rivers. Consequently, only the industrial parks situated close to water routes can enjoy the benefits of that situation. It often occurs that water transport is not utilized by industrial parks despite the availability of water transportation. On the other hand, being without direct water transport accessibility doesn't necessarily mean a handicapped situation, because among others, water transport connections might not be important for the companies of the industrial parks. Survey made among the firms of industrial parks served to confirm or to deny of that preconception.

– Relating to their accessibility to international or domestic airports, industrial parks can be divided into two groups. The first one involves the industrial parks situated relatively close (within 20 kilometre) to the nearest airport, the second one consists of industrial parks situated farther than 50 kilometre. Latter ones can be found mainly in Northern Hungary region, which can be explained with the low airport density of the region thanks to its hilly relief. Industrial parks with the best airborne traffic connections are settled in towns, especially in county seats (e.g. in Debrecen, Győr, Pécs, Szeged). The towns mentioned before have old traditions of air transport and they have had their own airports for decades.

From the closeness of industrial parks to the various elements of transportation networks, we can conclude which elements of transport infrastructure could play a role in their location choice and in what measure. Answers given to the questions focusing on these problems have also confirmed that high quality elements (highways, primary and secondary main roads) of public road network available in different measure are key transport factors for industrial parks in location choices. 43 out of 72 industrial parks have revealed that elements of public road and railway connections mentioned above have had the greatest influence on their location choice (Table 1).

**Table 1** The importance of different transport infrastructure elements in the location choice of industrial parks in Hungary, 2010

Denomination of different transport elements	Indicated by industrial parks*	
	Number	%
Motorways	43	59.7
Main roads	41	56.9
Railway lines with different quality	42	58.3
Railway terminals for freight traffic	16	22.2
Water transport connections (river ports)	9	12.5
Air transport connections (airports)	11	15.3
Other elements of transport	4	5.6
Transport connections were not important	7	9.7

\*An industrial park might indicate more transport elements.

Source: survey carried out in 2010.

Mostly road transport and rarely railway transport were in dominant position in case of industrial parks where waterborne and airborne traffic connections were also relevant factors in location choice. Only four industrial parks (Szigetszentmiklós Industrial Park, Rába Industrial Park in Győr, Kalocsa Industrial Park and Úlló Industrial Park) announced that each form of transport connections had influenced their site selections. All those industrial parks are settled along the Danube. Ten per cent of the industrial parks answered to the question of the survey that not a single transport factor had influenced their location choices.

Industrial parks classified into various types according to the role of different elements of transportation network in location choice do not form special territorial groups. Essentially, the categories have not had any spatial specific appearance they did not favour certain regions. On the whole, the investigation among industrial parks revealed partly the importance of road transport and partly the fact that these parks generally have a favourable transport geographical position. Motorways have played prominent role in location choice for industrial parks from the middle of 1990s and nowadays their differentiating function still has a great impact on the structure of the Hungarian industry.

## **MAJOR CONSEQUENCES OF THE SURVEY 2011**

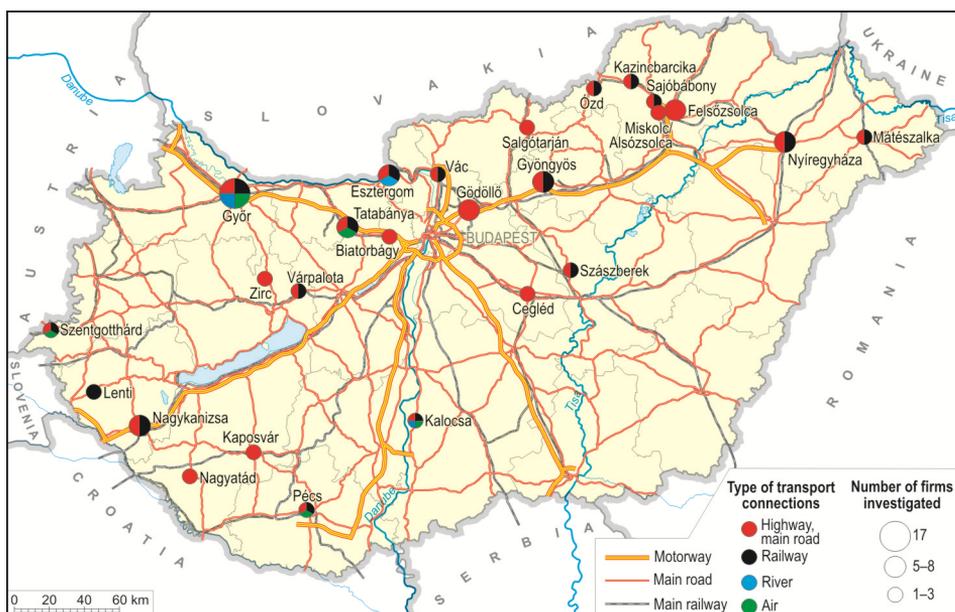
According to the survey carried out in 2011 the results of the research are summarized below:

– Referring to their different transport position, the majority (64 per cent) of the surveyed companies revealed that they had favourable connection possibilities to motorways. Nearly 40 per cent of them responded that they had accessibilities to main railway lines, but only few of them mentioned a neighbouring airport or a river port as important transport factors for their activities (Figure 5).

– The distribution of responses above seems to verify the hypothesis that transport intensive firms locate their activities in industrial parks with favourable highway and good railway accessibilities along the East-West international transport axes of Northern third of Hungary (Nyíregyháza–Miskolc–Budapest–Győr line).

– The favourable position in transport network seemed extremely important or very important for 68 per cent of the investigated companies as a factor of location. In case of enterprises with foreign interest that rate reached 78 per cent. From among the pathways of branches of transport, 61 per cent of the companies chose the motorways and additional 25 per cent mentioned the main roads as essential elements of transport infrastructure needed for their operation. The closeness of railway lines as a factor of location was important only for 13 per cent of the companies and the accessibility for a neighbouring airport was mentioned merely by 4 per cent of the investigated firms while the closeness of river ports proved to be a neutral factor of location for the interviewed companies. The survey underlined that transport intensive firms settled in industrial parks refuse to use railway transport mainly because of its organizational inflexibility, the low standards of its transport logistic services, furthermore, for its relatively high freight rates and missing rebates.

– The regional distribution of mainly transport intensive companies demonstrates a considerable rate of concentration in Western Transdanubia (27 firms) and Northern Hungary (17 firms). Only a dozen of them can be found in Central Transdanubia and 11 of them were settled in Central Hungary. Only seven firms represent the Northern Great Plain region and only a few of them moved into some of the industrial parks of Southern Transdanubia and Southern Great Plain region. This phenomenon demonstrates the industrial character of the investigated companies, their traditions in making all kinds of industrial products mainly for export and the relatively high technical level of the built-up infrastructure of industrial parks.



**Figure 5** Types of transport intensive enterprises in industrial parks by their connection opportunities to different branches of transport in Hungary, 2010 (Edited by Tiner, T. 2011)

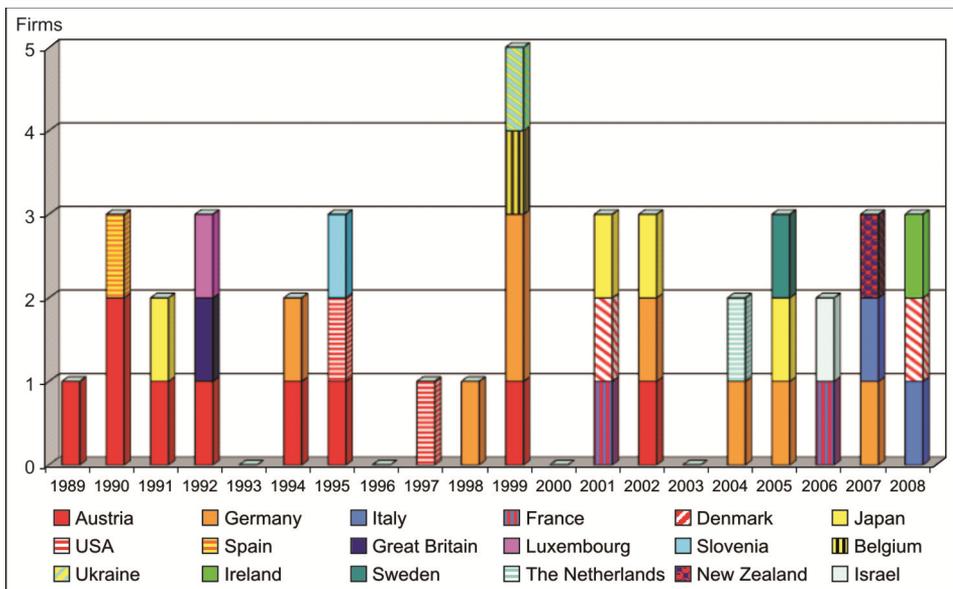
Source: survey carried out in 2011

– Considering the years of their foundation, the companies show a relatively balanced temporal distribution between 1985 and 2008. Slightly more than half of the firms (53 per cent) were founded in the 1990s, 43 per cent of them were established between 2000 and 2008 and merely five per cent of them started their activities before the regime change. 35 (nearly 40 per cent) of the surveyed transport intensive enterprises are owned by international corporations or joint ventures with foreign majority. Being a larger employer, their proportion in the total volume of employees reached 78 per cent out of the 83 surveyed companies. It is a general experience that foreign companies gave the majority of industrial productions, the incomes and profits in several branches of Eastern European economies (Kiss, 2010).

– Based on the collected data for the number of employees, it can be stated that the 83 investigated firms had increased the number of their employees from 4,250 to nearly 13,700 (3.2-fold increase) since their foundations. Among them the subsidiaries of transnational companies and joint ventures with foreign majorities increased their staff number from 3,350 to 9,810 (by nearly 6,500 persons) and purely domestic companies increased the number of their employees from 900 to 3,880 (by only 3,000 persons). Usually, the size of foreign companies is much larger than the Hungarian ones, partly because they are better-supplied by capital. The top 6 companies with the highest increase in staff number (above 500) were the Hungarian Suzuki Co, Esztergom Industrial Park (+2,100 employees), Coloplast Hungary Ltd, Tatabánya Industrial Park (+1250 employees), Videoton Elektro-Plast Co, Kaposvár Industrial Park (+920 employees), Horvath Transport Ltd, Gyöngyös Industrial Park (+670 employees) and ACC Glass Hungary Ltd., Tatabánya Industrial Park (+500 employees).

It is an important remark that the long-term prosperity of transport-intensive enterprises essentially depends on the volumes of foreign direct investments accumulating in different branches of the Hungarian economy. The volume and the rate of the accumulation of the national capital are far behind the desired level and serve only a few branches of the Hungarian economy (e.g. energy sector, special branches of agriculture).

– Wholly or partly foreign owned enterprises represented in the sample appeared in Hungary after 1989 and started their economic activities in different periods of the last decades. Austrian companies were among the first ones which launched their subsidiaries in Hungary. More than 75 per cent of them were established in Hungary before the year of 2000. Two thirds of the German owned companies and the German-Hungarian joint ventures were founded during the period of 1998–2002. American (USA) firms appeared in the early 1990s, but additional non-European companies (e.g. from Japan, Israel, New Zealand) started their activities in industrial parks only after 2001. During the early 2000s Hungary's preparations for the accession to European Union accelerated the establishment of enterprises with foreign interest and this contributed to the increase in the number of companies in the Hungarian industrial parks (Figure 6).



**Figure 6** Establishment of transport intensive enterprises with foreign interest in Hungarian industrial parks between 1990 and 2008 (according to the nationality of majority owner)

Source: survey carried out in 2011

– Spatial “density” of companies with foreign interests surveyed demonstrates the dominance of larger Hungarian towns which are easily accessible by motorways M1 (Győr, Tatabánya) and M3 (Gyöngyös, Nyíregyháza). The huge economic attraction of Budapest and its agglomeration zone also inspired foreign companies (e.g. the Israeli TEVA in Gödöllő) to choose their sites in Central Hungary offering transport infrastructure of highest quality. Hungary as a landlocked country with its relatively sparse river ports, underdeveloped river transport and airport infrastructure is rather unable to meet the high technical and logistical

requirements of international companies. Only Budapest and larger towns situated along the main transportation axes of road and railway transport are favoured by transnational companies (e.g. Audi in Győr, Coloplast in Tatabánya, Suzuki in Esztergom, Lego and Electrolux in Nyíregyháza etc.). The spatial concentration of foreign enterprises mentioned above also confirms this, as their majority is situated in the Northwestern and Northern parts of the country.

Furthermore, the investigation has outlined additional important phenomena:

-In case of 26.3 per cent of transport intensive enterprises both the place of origin of inputs and the destination of outputs could be found in Hungary.

-More than one fourth of the firms surveyed have not entered the international market yet, moreover, 90 per cent of them are wholly domestic owned.

-Two third of them are located in Northern Hungary, in the Southern part of Transdanubia and on the Great Plain.

-63.1 per cent of the firms importing goods and services both from Hungary and from other member states of the European Union are foreign-owned companies or joint ventures with mainly foreign interest.

-Nearly 72 per cent of them operate in industrial parks situated along the primary transport axis of Gyöngyös–Budapest–Győr line.

## CONCLUSIONS

The experiences of the surveys have clearly demonstrated that transport infrastructure had played an important role in the location choice of both industrial parks and their enterprises. It has been strengthened also that the main attraction factors for them are the good conditions for road transport, especially the routes of motorways. However, it is an unfavourable fact that additional modes of transport available are not used by them for different reasons. It also showed that the transport needs of industrial parks and companies settled in them are mostly in harmony with each other, but some problems were also mentioned (e.g. more industrial parks have bad public transport accessibilities, the quality of inner road network of several industrial parks is insufficient, public roads connecting arterial roads with industrial parks are often narrow and deteriorated etc.). These problems can determine the main directions of further developments too.

It has become obvious that there is a close correlation between the main indicators of industrial parks (year of establishment, area of industrial park, character of investment, rate of occupation etc.) and the quality of their transport connections. The majority of the enterprises settled in the industrial parks of Central Hungary (the region of most developed transport infrastructure), has a considerable economic advantage (e.g. in profitability) over the rest ones, mainly after the burst of economic crisis.

It has been also proven that the sites of enterprises and industrial parks are depending on the motorways in a great measure. This fact had a decisive impact on the regional pattern of the Hungarian industry and its shaping effect on the regional structure of industry has to be taken into consideration in the future too.

## REFERENCES

- Barta, Gy. – Enyedi, Gy. (1981) *Industrialization and the transformation of village*. Közgazdasági és Jogi Könyvkiadó, Budapest (in Hungarian language)
- Bodor, É. (2001) The importance of accessibility as a location factor. In (ed. C. Mezei) *Évkönyv 2001*, PTE KTK Doktori iskola, Pécs, 244–254. (in Hungarian language)
- Creditreform (2010a) *The top 500 companies by revenues in Hungary, 2005–2009*. Creditreform Ltd., Budapest (in Hungarian language)
- Creditreform (2010b) *The top 500 companies by profit in Hungary, 2005–2009*. Creditreform Ltd., Budapest (in Hungarian language)
- Kiss, É. (2010) *Spatial restructuring in the Hungarian industry after 1989*. Dialóg Campus Kiadó, Budapest– Pécs (in Hungarian language)
- Kiss, É. (2012) The impacts of the economic crisis on the spatial organisation of Hungarian industry. *European Urban and Regional Studies*, 19(1), 62-77.
- Kiss, É. – Tiner T. (2012) Depending on motorways – transport connections of Hungarian industrial parks and their enterprises. *Hungarian Geographical Bulletin*, 61(2), 131-154.
- Kozma, G. (2003) *Regional economics*. KLTE Kiadó, Debrecen (in Hungarian language)
- Rakusz, L. (2000) Industrial parks - information society. *Ipari Szemle*, 20(4), 14–15. (in Hungarian language)
- Regós, Zs. (2007) Hungarian industrial parks before changes. *Népszava*. február 3. pp. 6. (in Hungarian language)
- Tiner, T. (2010a) Far from the core – regions and industrial parks in economic shadow in Hungary (Part one). *Hungarian Geographical Bulletin*, 59(2), 89-106.
- Tiner, T. (2010b) Far from the core – regions and industrial parks in economic shadow in Hungary (Part two). *Hungarian Geographical Bulletin*, 59(3), 241-254.