

## THE TELEINFORMATIC MARKET IN POLAND - ITS GROWTH AND SPATIAL STRUCTURE

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**Abstract:** The significance of information in economic activity is increasing. The demand for processing, storing and distribution of information induces the development of the telecommunication and computer markets. The 1990s have been characterized by the rapid increase of the teleinformatic activities in Polish economy. The spatial distribution of the enterprises active on the teleinformatic market features the domination of the large urban centres, and in particular - of Warsaw. The spatial structure of the developing market is shown in the paper within the context of the new administrative division of Poland.

**Key words:** telecommunication, computer industry, spatial structure, large towns

### 1. INTRODUCTION

A specific feature of the structural changes in the global economy, taking place in the recent decades, is constituted by the constant and highly dynamic development of the telecommunication and computer activities. The rapid increase in these domains should be attributed to the growing role of information in economic processes. The teleinformatic activities (both telecommunication and computer-related ones) are expanding due to the increased need for creation, processing, storing and distribution of information.

The decades of 1980s and 1990s are marked by the increasing interpenetration of the telecommunication and computer technologies, reaching the stage when the clear delimitation of the two becomes difficult. This process finds its reflection in the strategies of enterprise development which, on the one hand, broaden their offer by entering some related segments of activity, and, on the other hand, motivated by the

growth perspectives, take up activity on the teleinformatic market, which is quite new to them. This latter scheme of development is also visible on the Polish market, which is now taking shape, since the teleinformatic market is being entered here by the companies from the petrochemical or power generation sectors. In both cases, irrespective of whether the reach of activity is local or global, the change or expansion of the company's offer is more and more often taking place through fusions or takeovers of other firms from the teleinformatic branch.

Side by side with the difficulty in defining the boundary between the telecommunication and computer branches, it turns out difficult, as well as to attempt for a dichotomous division into production and service activities. That is also why the presented report concerns all kinds of activities on the teleinformatic market, starting with production of equipment and ending with the highly specialised services.

According to some estimation (Sadowski, 1997: 19), in the second half of the 1990s, there have been about 6 thousand agents functioning on the Polish teleinformatic market. In view of the problems encountered when trying to gain statistical data characterising the whole branch the analyses contained in the present report are based upon the data concerning a few hundred biggest companies. It can be assumed in terms of an approximation that a vast majority of the turnover and employment of the branch can be assigned to the group of agents here accounted for.

In order to show the regional differences in the levels of development of the teleinformatic market the TP S.A. company - the national telecommunication operator - was excluded from the analysis. The scale of operation of this company (sales, employment) causes that the spatial image obtained having taken this particular agent into account would distinctly differ from the actual one. Such decision is also a consequence of the adopted method of analysis, according to which the data from each enterprise (even those operating several branch departments) were assigned the respective administrative unit, i.e. the seat of the firm's headquarters. The exceptions from this principle were made solely in the cases when data were available on the activity of individual local departments or branches of a given company.

The purpose of the report is to provide an initial analysis of the growth and spatial structure of the Polish teleinformatic market in the period 1993-1998. The fact of introduction of the new administrative division in Poland at the beginning of 1999 made it possible to show the development of the market at the level of poviats (counties, the second, intermediate level of the administrative division). Finally, an attempt was undertaken confronting the regional differences in the structure of the teleinformatic market with the selected socio-economic features of the population and economy of Polish poviats.

## 2. THE DEVELOPMENT OF THE TELEINFORMATIC MARKET IN THE 1990S

The essential transformations, which have been taking place in Polish economy in the present decade include the introduction of the fundamentals of market economy, the increasing level of activity of the private sector, and the increasing scale of foreign capital presence. Along with these transformations, the teleinformatic market has also been emerging, virtually from scratch.

In the domain of **telecommunication**, the present decade constitutes the period of catching up in terms of the existing civilisational shortcomings, primarily through an improvement in availability of telephone equipment and service. Rapid changes in this area have been partly forced by foreign agents, starting their activity in Poland and accustomed to a high quality of telecommunication infrastructure. This influenced the development of stationary (cable) telephone network, as well as mobile (cellular) telephone systems. Between 1989 and 1998 the number of stationary telephone users increased from 3.1 million to 8.8 million. Since 1992, the development of mobile telephone systems has been taking place, initially operated in the analogue technology, and starting with 1996 also in digital technology (GSM). The number of users of mobile telephone systems increased from 216 thousand in 1996 to 1 945 thousand in 1998 (*Łączność...*, 1999: 21).

Among the agents functioning on the telecommunication market the dominating position is occupied by the state operator TP S.A., providing service across the network of more than 8.4 million users of stationary telephones. In 1998, the company employed more than 72 thousand persons and the revenue from its activities attained more than 2.5 billion USD. The group of remaining operators provided service to the mere 323 thousand users.

The market segment of cellular telecommunication is, however, dominated by the private sector agents. The country-wide digital networks are being provided service by the companies with a share of foreign capital: Polcomtel (AirTouch and TeleDanmark - 19.25% of shares each), Polska Telefonía Cyfrowa (Media One Group and DeTeMobil - 22.5% of shares each). Likewise, the Centertel company, dominated by TP S.A. (the country-wide network of analogue telephones and the digital network Idea concentrated in the largest agglomerations) has a foreign investor (France Telecom - 34%).

The presence of foreign capital is also visible in production of equipment. The basic suppliers of high capacity telephone exchanges are the former Polish state enterprises transformed into the branches of foreign corporations, like the ones in Poznań (Alcatel), Bydgoszcz (Lucent Technologies), and in Warsaw (Siemens) (Wilk, 1998: 173). A definite share of enterprises with Polish capital is seen only in the domain of small exchanges (DGT and Mikrotel - Gdańsk), as well as telephone receivers (Cyfral - Łódź, and RWT-Telefony Polskie - Radom).

In contrast to telecommunications, the **computer market** in Poland is the domain of activity of a much higher number of agents (several thousand). The shares of Polish

and foreign agents in various segments of this market (production of computer equipment and peripherals, software development, service, distribution) differ as well.

At the end of 1998, the magnitude of Polish computer market was estimated at close to 2 billion USD. The computer companies were indicating as their basic customer groups - side by side with individuals - the following kinds of entities: industry (64%), central administration (50%), banking and finance (31%), trade and commerce (30%), and telecommunication (25%) (*Polski rynek...*, 1999: 82).

Since the beginning of existence of the computer market in Poland, an important position was taken by Polish firms. Gradually, though, the share of foreign firms has been increasing, these firms encountering an obstacle to adequate profitability of investing on the Polish market constituted by the problem of software piracy.

The analyses of the magnitude and structure of the market are founded on the annual reports (from the years 1993-1998) concerning telecommunication and computer companies in Poland, published by Polish edition of *Computerworld*. The dynamics of the market growth is demonstrated in an indirect manner by the magnitude of revenues of the 250 largest firms from the branch. While in 1993 their total sales amounted to 2 262 million PLN (Polish zlotys), in 1998 this value increased to 22 947 million PLN (9051 million PLN in constant prices of 1993). The structure of sales in the particular magnitude groups of enterprises, featuring a clear domination of the largest companies, remained almost unchanged. The share of companies from the upper quintile (20%) in the revenues of the whole group of 250 companies fluctuated between 65 and 75% in the period considered, while the share of the lower quintile - between 2 and 3%.

The number of persons employed also illustrates the growth of the market. In the period here analysed (1993-1998) employment in the 250 largest enterprises increased threefold, from 10.6 thousand to 33.1 thousand persons. Like in the case of sales, also here the upper 20% of the largest companies dominated, employing approximately 2/3 of all those working in the 250 firms. The changes in the magnitude structure of the enterprises active on the teleinformatic market are shown on Fig. 1.

A gradual increase of the average magnitude of an enterprise is visible. In the year 1993 a firm occupying the 200th rank would employ 11 persons, while in 1998 - 27 persons. During the five years the share of companies employing more than 50 persons increased from 20.4% to 57%. Changes are also apparent in the group of enterprises employing 100 and more persons. Between 1993 and 1998 the number of such firms in the group of 250 largest ones increased from 14 to 81 (of the ones employing 500 and more persons - from 2 to 14).

The early stage of development of the Polish teleinformatic market is also seen through the age structure of the enterprises analysed. Close to 3/4 (73.8%) of the 800 largest ones were established in the 1990s, 22.8% - in the preceding decade, and 3.4% of companies started their activity before 1980. A more detailed analysis shows that the largest number of firms (almost half of them) were established in the period 1990-1993 (the highest annual number having occurred in 1991, corresponding to every sixth firm from the group).

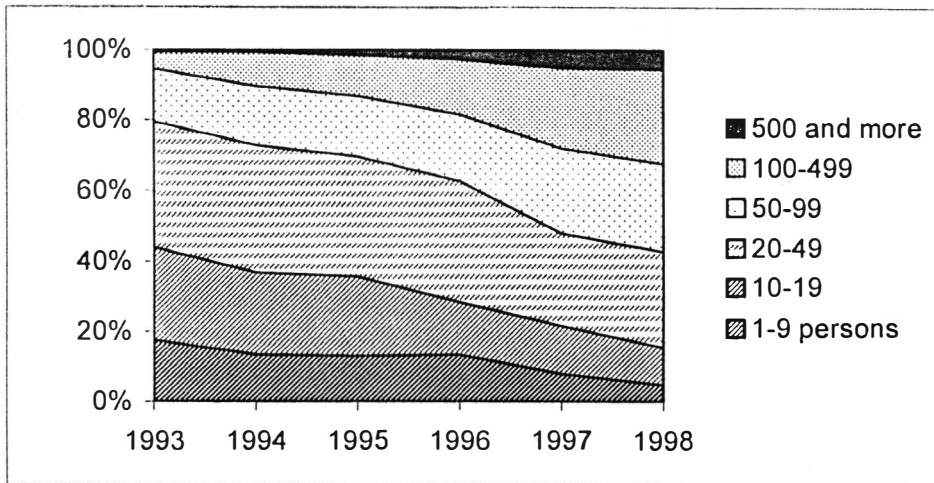


Fig. 1 Changes in employment structure of the 250 largest companies on the teleinformatic market

Besides the changes in the size of the market and the magnitude structure of the enterprises, one can observe the shifts in the branch structure of the computer market. There has been a distinct decrease of the share of equipment producers and sellers (computers and peripherals). On the other hand, an increasingly fast growth of the role played by the service activities is observed. Likewise, growing significance is achieved by the enterprises dealing in computer advising and training. As the degree of technical advancement of computer systems raises the position of the companies offering system integration (of the telecommunication and computer systems) within the framework of an enterprise, also increases. It is more and more frequent that the computer services are being commissioned from the outside, supplied by the independent, specialised firms, external to the structures of an own enterprise.

### 3. THE SPATIAL STRUCTURE OF THE MARKET

Geographical literature brings numerous examples of location of the relatively technologically advanced activities in the largest urban centres. This is visible in Europe in, for instance, Sweden, where Stockholm dominates (see Lundmark, 1995: 129), or in United Kingdom - with London and the SouthEast region dominating (Green, Howells, 1988: 267).

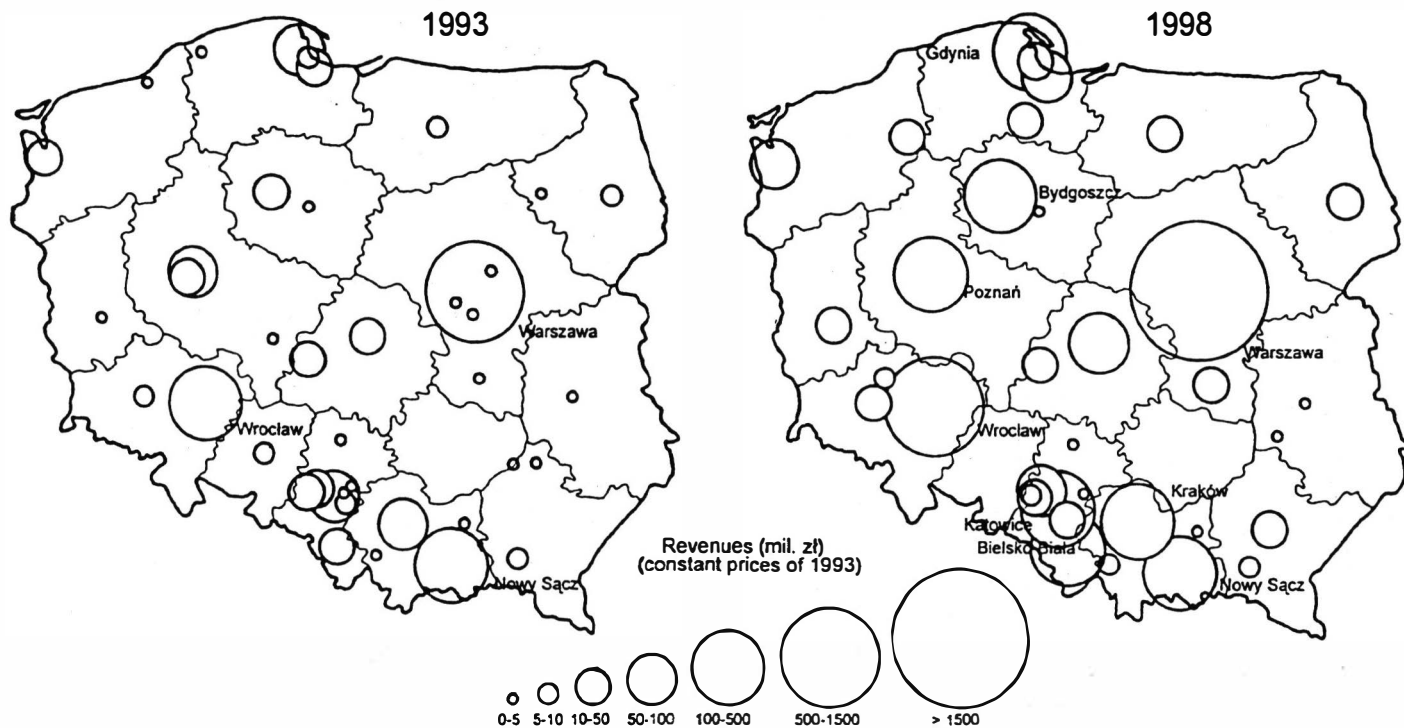


Fig. 2 Spatial structure of the teleinformatic market according to poviats (spatial distribution of the 250 largest companies)

The spatial structure of the Polish teleinformatic market is closely related to the structure of the Polish settlement system, since the largest shares in this market coincide with the largest urban centres.

An interesting image of the market is obtained when we compare the distribution of the largest enterprises across the units of the new (introduced in 1999) administrative division of the country. If we assume that the basis for analysis is constituted by the units of the second tier of the administrative breakdown (poviats or counties), then we can state that a large proportion out of the 250 largest enterprises are located in Warsaw poviat. Thus, in 1993 there were 101 firms located in Warsaw. During five years (i.e. until 1998) this number increased to 132 (more than half of the population considered). In terms of sales value and employment, the respective shares of the Warsaw poviat increased in this period from 47 to 72% and from 37 to 55%.

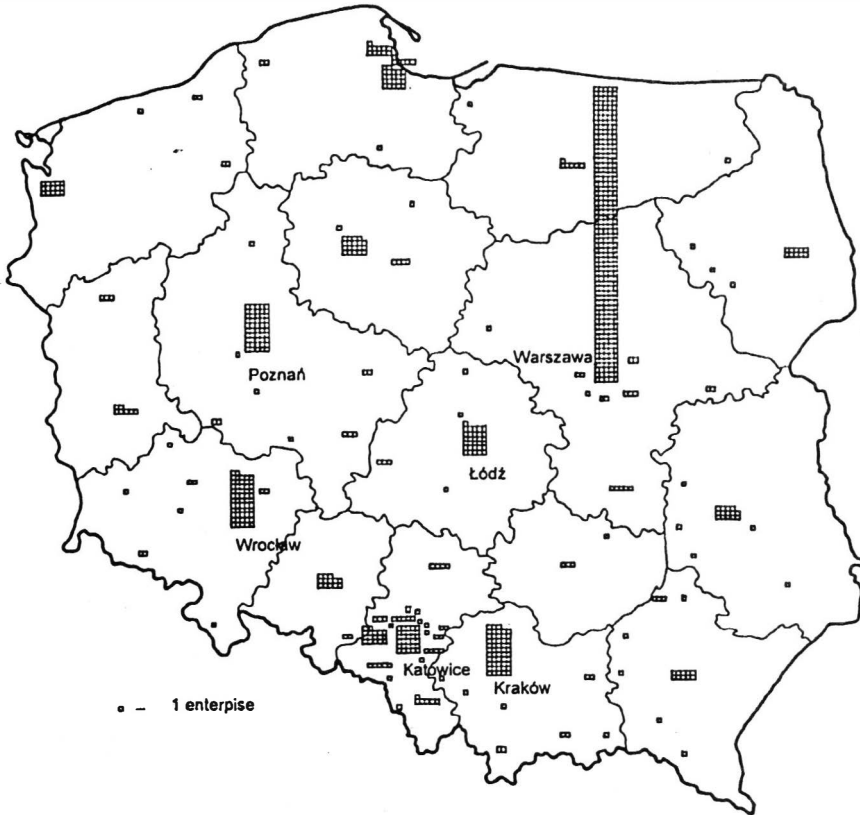
In 1993, all of the 250 largest enterprises were located in just 41 counties, including 34 urban counties, out of the total of 373 poviats in Poland. After five years a further increase of this spatial concentration of the agents analysed was observed, since at the end of 1998 the group had their seats in only 36 poviats (out of which 29 were urban poviats) - see Fig. 2.

Apart from the already mentioned case of Warsaw the highest numbers of enterprises had their seats in the following urban counties: Wrocław (21), Cracow (18), Poznań (15), Katowice (14). Somewhat less frequently the firms would choose Łódź (7 companies), Gdynia and Gliwice (6 each). Until 1998 the shares of Wrocław and Cracow got even (19 each). There were only 12 firms from the group of the largest ones located in Poznań at that time, 8 in Łódź, and 6 in both Bydgoszcz and Katowice. Side by side with the biggest urban poviats single large enterprises (according to sales volume) were located in poviats of Nowy Sącz (Optimus company), Legnica (Cuprum 2000) and Sieradz (Invar). In spite of a relatively short period of analysis (five years), a definite persistence of the spatial structure of Polish teleinformatic market can be observed. The largest towns preserve, and even in a sense strengthen their dominating position.

The absolute domination of the Warsaw poviat is especially well seen in case of enterprises with foreign capital. Thus, in 1998 only 8 out of 65 firms with 100% share of non-Polish capital were located outside of Warsaw (in the remaining large towns). Yet, each of these firms had offices or branches in Warsaw as well.

Concentration of the largest enterprises in the largest towns is a frequent phenomenon on the international scale. Broadening of the sample analysed from 250 to more than 800 of the largest firms makes it possible to observe a somewhat more precise spatial image of the teleinformatic market (see Fig. 3).

Out of the total of 818 enterprises in the broadened sample as many as 310 had their seat in Warsaw county (38%). The remaining ones were located within the confines of 93 poviats (1/4 of all the 373 poviats). The companies were definitely more frequently located in the urban poviats (750 companies out of 818 analysed), namely in 52 out of the total of 66 urban poviats in Poland. Only 58 of the enterprises considered were located in rural poviats (in 42 out of the total of 307 such poviats).



**Fig. 3** Spatial distribution of the teleinformatic enterprises according to poviats (in 1998)

In terms of provinces or voivodships (the total of 16), of more than 800 firms, the biggest numbers were located in the following provinces: Masovian (more than 1/3), Silesian (approximately 10%), Lower Silesian, Little Polish, and Greater Polish (8% each). The lowest shares were observed in Holy Cross, Varmian-Masurian, Lubusza, and Podlasie voivodships (between 0.5 and 1.5%).

#### **4. AN ATTEMPT FOR EXPLANATION OF SPATIAL CONCENTRATION**

In order to explain the present spatial structure of the teleinformatic market in Poland we will take a look at the main centres of the Polish industry producing computer



means in the past decades. At the beginning of 1980s, this industry was located primarily around the Warsaw and Wrocław centres. The plants turning out the final products were usually located in large towns, while the branches and the co-operating plants - in the not too distant smaller centres (Werner, 1983: 43).

Due to economic transformations of the 1990s many plants were liquidated, changed their owner and/or the activity profile. The relatively low mobility of the labour force causes that the newly established plants can take advantage of the local resources of skilled manpower. It can be expected (though there are no reliable data on this subject) that a part of the new domestic companies are owned by the persons who gained professional experience by working in the former state-owned enterprises of the electronic industry.

The spatial distribution of the enterprises active on the teleinformatic market displays a connection with the population potential of the individual units of the administrative breakdown (poviats), see Table 1.

The largest urban centres constitute ample sales markets for many products of the telecommunication industry (like cellular telephones) or of the computer industry (personal computers and peripherals).

**Table 1** Poviats according to population numbers (1997) and numbers of teleinformatic companies (1998)

Rank	Powiat	Population in '000	Rank	Powiat	Enterprises
1	Warsaw	1 608	1	Warsaw	132
2	Łódź	804	2	Cracow	19
3	Cracow	715	3	Wrocław	19
4	Wrocław	639	4	Poznań	12
5	Poznań	563	5	Łódź	8

Location of the enterprises in large towns is also motivated by the labour factor. In the university centres (hosting universities of technology and computer departments of various specialisations) it is namely possible to acquire staff of adequate education level. The biggest universities teaching future engineering and computer science specialists are located in large towns (such as Warsaw, Cracow, Wrocław, Poznań, Gdańsk, Gliwice or Łódź).

Large towns, being the primary and most dynamically developing centres of economic activity (in the domains of industry, but in particular - of service) generate also an important part of demand for the teleinformatic goods and services. Ample sales market, especially in the domain of goods and services of high level of technological advancement, motivates the teleinformatic companies to locate their activities in the regions around large towns.

That is why it should be expected that even taking into account a certain future alleviation of the resistance caused by distance (due to advancement in the field of

telecommunication) the most important part of the enterprises of the teleinformatic market will still be located in the largest Polish urban centres.

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## Resume

### Rynek teleinformatyczny w Polsce - wzrost i struktura przestrzenna

Celem opracowania jest analiza wzrostu i struktury przestrzennej polskiego rynku teleinformatycznego w okresie 1993-1998, oparta na informacjach pochodzących z kilkuset największych przedsiębiorstw. Wprowadzenie od 1999 roku nowego podziału administracyjnego kraju pozwala ukazać rozwój rynku na szczeblu powiatów. Podjęto także próbę powiązania różnic regionalnych w strukturze rynku teleinformatycznego z wybranymi cechami społeczno-gospodarczymi powiatów.

Jedną z cech zmian strukturalnych w gospodarce światowej ostatnich dziesięcioleci jest rozwój działalności telekomunikacyjnej i informatycznej. Lata 80. i 90. to okres coraz większego przenikania się obu rodzajów działalności, co powoduje rosnące problemy z wyznaczeniem granicy między branżami oraz podziałem na działalności produkcyjne i usługowe.

W polskiej telekomunikacji mamy do czynienia z odrabianiem zaległości cywilizacyjnych, poprzez poprawę dostępności sprzętu i usług telefonicznych. Obserwujemy rozwój zarówno telefonii stacjonarnej jak i przenośnej. Wśród przedsiębiorstw dominującą pozycję zajmuje TP S.A., pełniąc rolę operatora narodowego telefonii stacjonarnej. Segment telefonii przenośnej opanowany jest przez podmioty sektora prywatnego, z udziałem kapitału zagranicznego. Jego obecność widoczna jest także w produkcji sprzętu.

Także w poszczególnych segmentach rynku komputerowego udział podmiotów krajowych i zagranicznych jest różny. W strukturze branżowej rynku komputerowego

zmniejsza się udział przedsiębiorstw produkcyjnych i sprzedawców sprzętu a coraz wyraźniej wzrasta rola działalności usługowych (doradztwo, szkolenia).

Struktura przestrzenna polskiego rynku teleinformatycznego nawiązuje w dużym stopniu do struktury krajowego systemu osadniczego, z dominującą pozycją największych ośrodków miejskich. Pomimo krótkiego okresu analizy (5 lat) zauważalna jest względna trwałość struktury przestrzennej rynku. Największe powiaty miejskie (zwłaszcza Warszawa) zachowują lub nieco umacniają swoją dominującą pozycję. Dominacja powiatu warszawskiego widoczna jest szczególnie w przypadku przedsiębiorstw z kapitałem zagranicznym.

Wyjaśnienie obecnej struktury przestrzennej rynku teleinformatycznego powinno m.in. uwzględniać:

1. główne ośrodki polskiego przemysłu środków informatyki w poprzednich dziesięcioleciach (lokalizacja głównie wokół ośrodka warszawskiego i wrocławskiego);
2. potencjał ludnościowy poszczególnych powiatów (wykwalifikowana i ciągle niezbyt mobilna siła robocza w ośrodkach akademickie);
3. chłonny rynek zbytu wyrobów i usług telekomunikacyjnych w największych ośrodkach miejskich.

Duże miasta, jako najdynamiczniej rozwijające się ośrodki działalności gospodarczej (zwłaszcza usługowej) także w najbliższej przyszłości będą stanowić chłonny rynek zbytu, szczególnie dóbr i usług o wysokim poziomie technologicznym. Należy oczekiwać, że najpoważniejsza część przedsiębiorstw rynku informatycznego w Polsce będzie nadal zlokalizowana w największych ośrodkach miejskich.