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APPLICATION OF VECTOR'S TYPOGRAM METHOD. A CASE STUDY OF WARSAW SUBURBAN INDUSTRY

The suburban zone involves an area where the town visibly influences the ways of utilization and management of the terrain as well as social and economic conditions (Knapp 1983). It has been accepted that the area of the influence of Warsaw comprises the entire voivodship and so the suburban zone is identified with it. The concept of industrial structure means the participation of the potential of production and the number of people employed in the particular branches of industry. Changes in distribution comprise the creation of new plants and the development or liquidation of the existing ones. Changes in the structure of industry are the result of changes in the distribution of works.

Industrial role of the suburban zone is considered as its youngest function, coming after such roles as recreational, agricultural or service (Liszewski 1987). On the one hand, industries uncomfortable in towns (steelworks, chemical industry, food industry) are located in the suburban zone; on the other hand, the industry which is connected with natural resources of the zone (brick-yards, sawmills, gravelpits) is developing here (Misztal 1979). In each case the location of new plants is a form of active or passive degglomeration of a great city (Liszewski 1987). The suburban industry is connected with satellite towns of the agglomeration, less frequently with scattered villages. In the industrial structure of the entire area the suburban zone should play a complementary role. At the same time, the results obtained hitherto show great differentiation of industry in Warsaw suburban zone (Misztal 1970). The industrial function is also considered as one of the most important town-creating functions in the area (Liszewski, Pączka 1983).

AIM AND METHOD OF RESEARCH

The aim of the research is to find out changes in the state of industrialization and the evaluation of changes in the structure of industry of the Warsaw suburban zone in 1980-1986, assuming that the developed, "mature" industry is characterized by the extremely varied structure, while not fully developed industry has one or few predominating branches and the absence or underdevelopment of

others (Kortus 1986). The evaluation of the industrial structure has been done by means of vector typograms resembling, in their construction and interpretation, Ossan's triangle, well-known and used in geographical research. The research comprised 58 towns and communities of the voivodship. The following features were taken into consideration: (i) the number of employees in industry, according to branches; (ii) the area of plants according to branches of industry; (iii) consumption of electric energy according to branches of industry (in two points of time: 1980 and 1985).

Three vector typograms were obtained. Points representing the industrial structure of single Warsaw quarters and of the region as a whole were also showed for comparison. The interpretation of the typogram consists in the evaluation of the situation of points (which represent the structure of a given feature of industry in spatial unit). The structure may vary from the predominance of one branch to the uniform distribution of the given feature. In the former case the point is located at the vertex of the polygon, in the latter — in its middle. The interpretation of points located inside the typogram is very difficult. Generally speaking, the nearer is a point to the middle the more equilibrated the industrial structure. The structural differentiation of industry in a town or community may be expressed by means of the Euclidean distance. Since the position of a point is also expressed by complex number (a pair of real numbers) it can be considered as a synthetic measure of the structure.

STRUCTURAL AND SPATIAL CHANGES OF INDUSTRY IN THE WARSAW SUBURBAN ZONE IN THE YEARS 1980-1986

In the years 1970-1980, the industry of Warsaw suburban zone underwent considerable changes in respect of distribution of plants, structure and size of employment in the particular branches. Tendencies to balance disproportion were keeping up. In the eighties, a considerable drop of employment was noted.

Table 1

Number of plants and the size of employment in the industry of Warsaw voivodship

	1980		1985		1986	
	plants	empl. (thous.)	plants	empl. (thous.)	plants	empl. (thous.)
voivodship	2544	322.3	1982	259.1	1789	250.4
towns (except Warsaw)	594	57.0	433	47.9	357	46.5
rural areas	268	10.3	101	7.1	87	6.7

There was a violent drop of plants number and employment in the industry of Warsaw suburban zone. A still greater decrease was noticed in rural areas. Over a half of plants liquidated in 1980-1985 (55%) were located in the suburban zone and 31% in towns. Closure or liquidation concerned small plants employing a

low number of people, particularly in rural areas, where the potential of industry decreased by half the number of employed and 2/3 of the number of plants (in towns 1/5 and 1/3 respectively — the same as in Warsaw). Tendencies to decrease did not concern all the towns to the same extent. A small increase of employment has been observed in areas where large state-owned factories prevail.

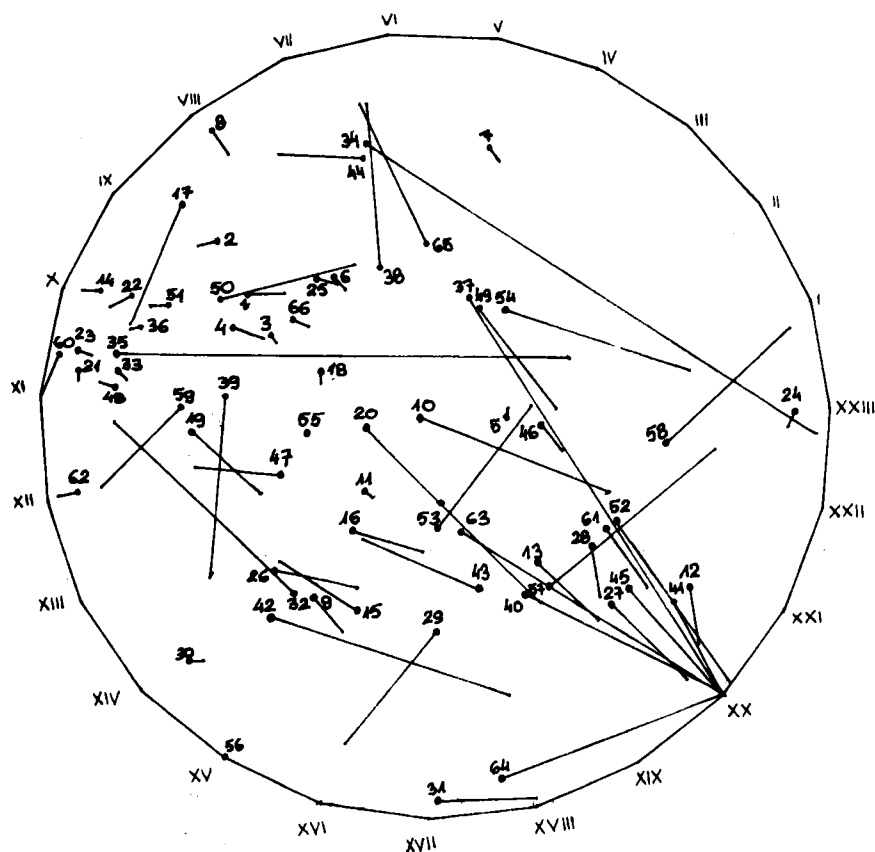


Fig. 1. Changes of the structure of employment in industry of Warsaw suburban zone 1980-1986.

CHANGES IN THE STRUCTURE OF EMPLOYMENT

The structure of employment in different branches of industry did not change very much in the whole region. Instead, considerable reshuffle occurred in some areas (Fig. 1). The smallest changes were observed in the most industrialized towns of the suburban zone (located along the railway directed to the SW). A large group consists of areas where important changes are directed toward the predominance of

food industry. It concerns, among others, rural areas in the North and East of the agglomeration. The main cause of those changes was the liquidation of other plants. The next important group consists of those towns and communities where in spite of great changes in the structure of employment in industry the balance and differentiation of this structure have been preserved. Since the descriptive interpretation of the typograms is not sufficient, it has been completed with maps presenting the differentiation and dynamics of changes in industry (Fig. 2).

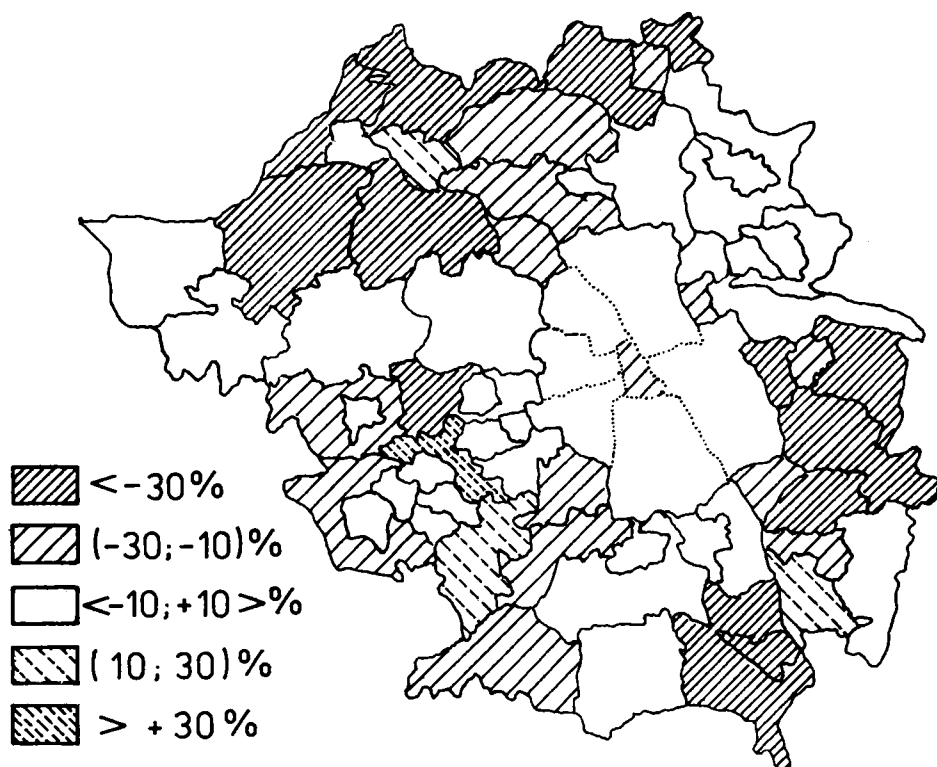


Fig. 2. Dynamics of the structure of employment in industry of Warsaw suburban zone 1980-1985

CHANGES OF THE SIZE OF INDUSTRIAL AREAS

The surface of industrial areas in the towns of the suburban zone of Warsaw decreased from 27.7% in 1980 to 7.9% in 1985. In rural areas it decreased from 7% to 2.7%. Instead, industrial grounds within Warsaw increased (there were some changes of the boundaries).

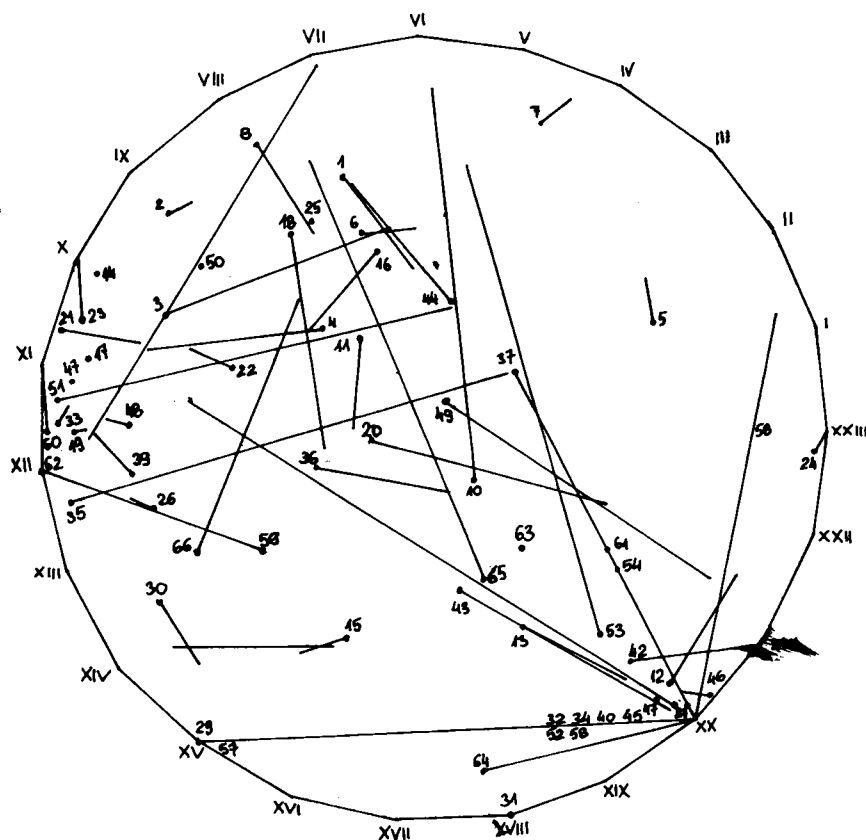


Fig. 3. Changes of the size of industrial areas of Warsaw suburban zone 1980-1985.

Table 2

Surface of industrial areas in Warsaw voivodship

	1980	1985
voivodship	70.6 km ²	87.5 km ²
towns (except Warsaw)	19.5 km ²	6.9 km ²
rural areas	4.9 km ²	2.3 km ²

The analysis of changes of the plants area according to branches of industry in towns and communities of the suburban zone allows us to observe the resemblance of typograms of the employment structure and those of surface. Changes of the size of industrial areas correspond with changes of the number of plants and of people employed.

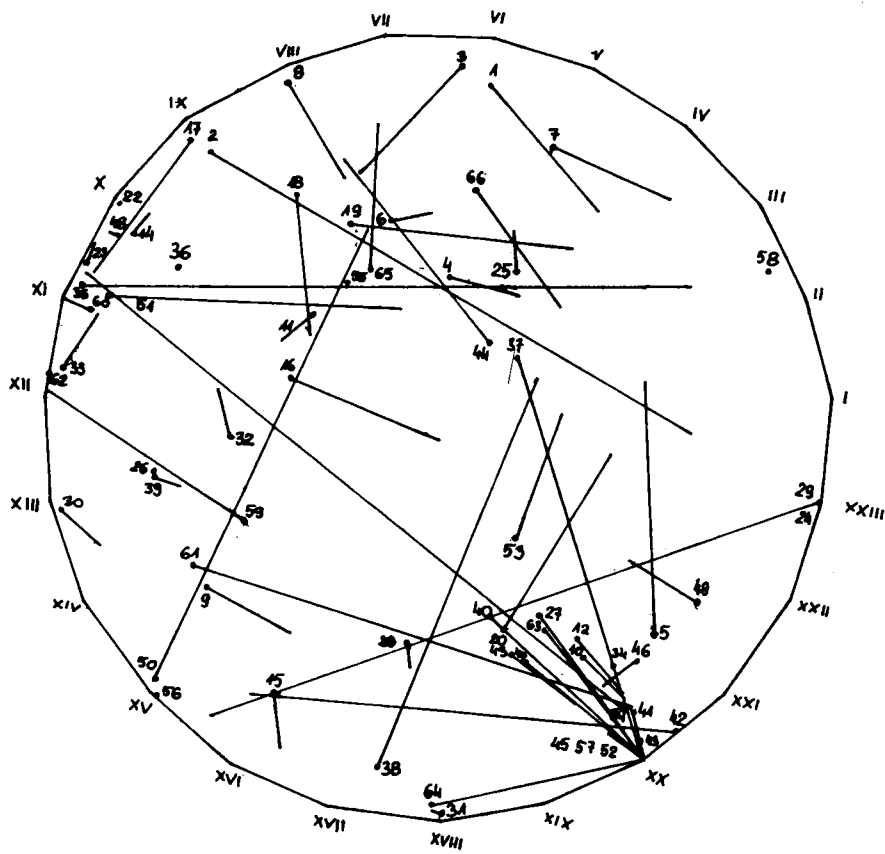


Fig. 4. Changes of the structure of the consumption of electric energy in industry of Warsaw sub-urban zone (1980-1985).

CHANGES OF THE WOLUME AND STRUCTURE
OF ELECTRIC ENERGY CONSUMPTION

In 1980-1985 a visible drop of electric energy consumption was noted in the industry of the region. This tendency, however, did not comprise towns of the suburban zone. The typogram representing changes of electric energy consumption in the particular branches of industry does not allow us to determine the prevailing tendency.

Table 3

Consumption of electric energy in industry of Warsaw voivodship

	1980	1985
voivodship	6719.9 thous. kWh	4235.6 thous. kWh
towns (except Warsaw)	440.6 thous. kWh	473.6 thous. kWh
rural areas	64.8 thous. kWh	47.2 thous. kWh

CONCLUSIONS

The characteristics of the industry in Warsaw suburban zone show that this zone constitutes only a small part of the production potential of the region. The distribution of plants is characterized by the great disproportions resulting from the lack of a uniform point of view as to the function and role of towns in this area (Rakowski, 1975). The structure of industry is differentiated. However, the participation of the whole suburban zone in any of the studied features of industry has not exceeded 1/5 of the potential of the whole voivodship. It may then be stated that industry in this area is characterized by a relatively high stability in a few larger centres where big state-owned factories have developed.

Instead, most small, private or cooperative plants are fast liquidated in a situation when production is developed owing to increasing employment and no technical investments improve the work. This concerns, in the first place, rural areas and towns lying far away from railway lines, where tendencies of industry to decline are much stronger (in 1980-1986 over 50% of the number of plants were liquidated).

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