

ANATOL JAKOBSON

Irkutsk State Transport University, Russia

## Measuring and ranking the innovative potential of cities

The problem of ranking cities according to their individual intellectual (innovative, organizational, creative, central etc.) potential is actual and important for geographic studies in the epoch of post-industrialization. This question has been discussed in the annual International Conferences in the Pedagogical University of Krakow.

Already in 2008, T. Stryjakiewicz prepared a report on the role of creative sector as a factor of regional development in Poland and some other European states (later published in Irkutsk (Stryjakiewicz 2009)). This work deals with two relatively new notions, ‘creative industries’ and ‘knowledge intensive industries’.

In 2011, the conference participants heard a very interesting report by P. Siłka, whose main idea was to classify cities on the basis of their innovative potential structure (so far, it has been published only in the form of a short summary (Siłka 2011)).

It is obvious that the results of such typology or ranking can be applied in various aspects and directions of the regional policy. They can be linked with a number of theoretical or ideological backgrounds, such as central places theory, growth poles (polarized development) concepts, the ideas of the quaternary sector, of post-industrial stage of development, of knowledge-based economy, etc.

In this paper, however, we are interested only in purely geographic aspects, common for various approaches.

### METHODS OF RANKING CITIES: FRENCH EXPERIENCE AND ITS FORMALIZATION

The very idea of ranking cities in the interests of regional policy seems to have been first formulated in France in the early 1960s (Hautreux, Lecour, Rochefort 1963). The research concerned was aimed at solving the problem of hypercentralization in that country through forming ‘metropoles d’équilibre’ in the periphery, to counterbalance Paris. The task was to find such French cities that would be ready to fulfil this role.

The methodology of the research can be described in the following way.

Among the peripheral French cities (i.e. except Paris), 22 biggest ones were chosen. For each of them, statistical data were analyzed, characterizing somehow the contemporary state of the organizational – let us use this term – functions.

The indices of two types were adopted. The first type includes the ones characterizing the level of development of non-productional (tertiary together with quaternary, without using the latter word) functions, such as banking, education, research work, sports, theatres, etc. The second type included those that could characterize the size of the area influenced by the given city.

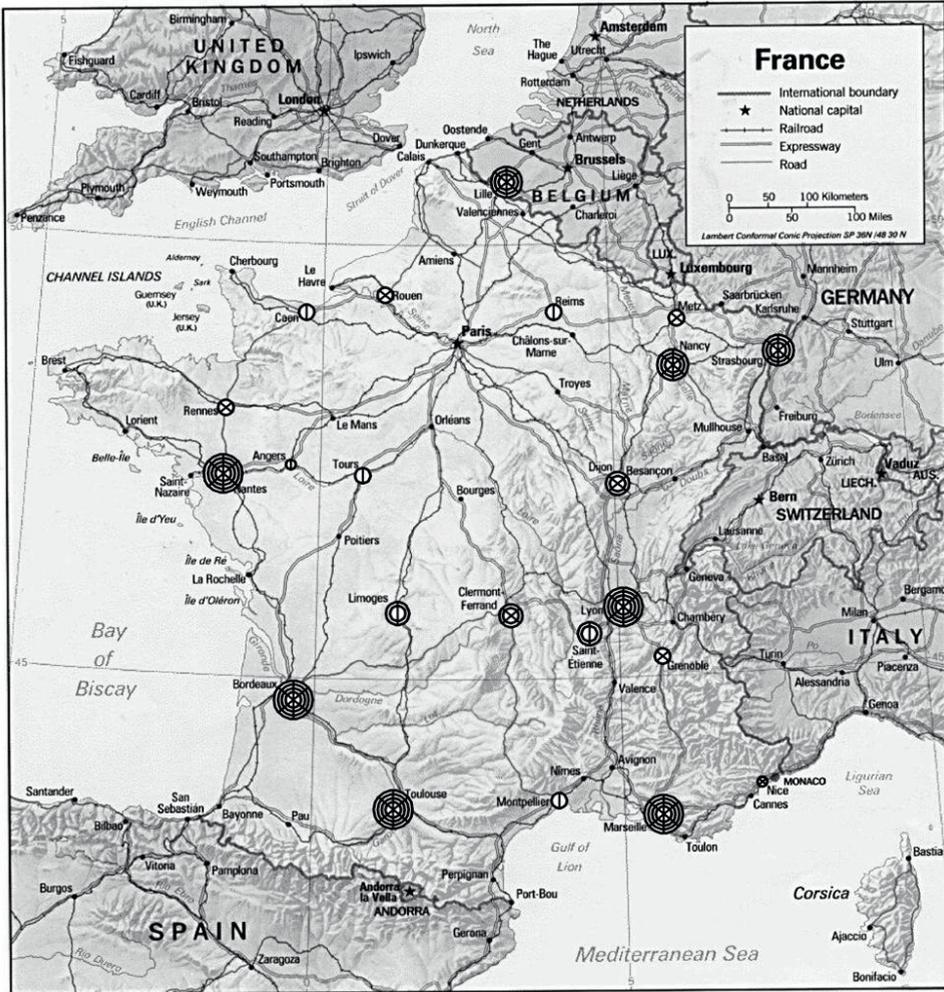


Fig. 1. The network of 'metropoles d'équilibre' in France obtained from the research on organizational potential. The number of concentric circles reflects the rank of the influence zone, while the number of diameters crossing them – the rank of the level of non-productional functions development

Source: Hautreux, Lecour, Rochefort, 1963

What was done further can be approximately expressed by means of the following formula (in our formalization):

$$R_n = \Phi \sum r_{ni},$$

where  $\Phi$  is the operation of conferring a symbolic rank (from 0 to 4 points) to any object from some set, through dividing the set of values corresponding to various objects into 5 groups;

$r_{ni}$  is the value of the  $i$ -th index (from some set of indices) for the  $n$ -th object, expressed in the same points from 0 to 4; it is clear that, to be expressed in this way,  $r$  must itself be the result of operation  $\Phi$ , applied to the sum of other, more detailed indices.

The final result is shown in Figure 1, where 8 cities with the highest ranks can be seen clearly.

APPLICATION TO SIBERIA: RESULTS OF CALCULATIONS

Later, in 1980s, we used this idea to rank Siberian cities as to their administrative potential (Jakobson 1994). The important innovation in the methodology was introduction of a principally new index, crucial just for Siberia (although maybe less important in Europe), that is remoteness from the nearest comparable or obviously more significant city.

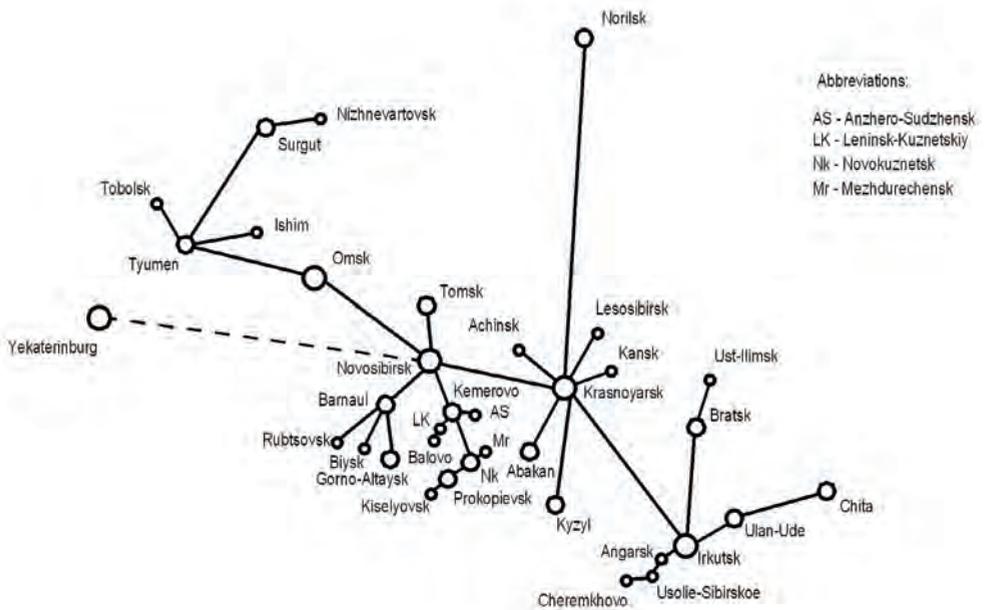


Fig. 2. The graph used to determine the directions of links between Siberian cities, and to measure the distances

For example, for Norilsk, the distance from Krasnoyarsk is 2000 km, which increases its central potential in comparison with the value obtained on the basis of taking into account such traditional indices as the levels of development of research, educational, cultural, etc. functions. Vice versa, if we estimate the potential of Angarsk, we see that it is too near to much bigger Irkutsk and this fact prevents it from becoming a significant regional centre.

Another specific function, important for the Soviet Union (due to both enormous distances in the country and state-administrated character of those-times economy), was territorial sectoral management. For example, Irkutsk was the centre of regional administration in such spheres of activity as railroad, civil aircraft, river navigation, civil construction, water use, mining control, coal mining, etc. It can be added that the borders of various regions mentioned above differed from each other and never coincided with the limits of administrative units – oblasts, krays or autonomous republics. In some cases, a sectoral region included several such units (as an integrated unit), and sometimes was built on principally other grounds, for example, coinciding with a watershed). This made the rank of Irkutsk significantly higher than that of some other cities of formally equal level.

The calculations showed that only Novosibirsk was characterized by maximum values of all the indices (some of which were determined, using the method and formula of the French research). Its population exceeded 1 million (equalled by Omsk only), the distance from the nearest comparable city (Sverdlovsk, outside Siberia) was approximately of the same order as that from Norilsk to Krasnoyarsk.

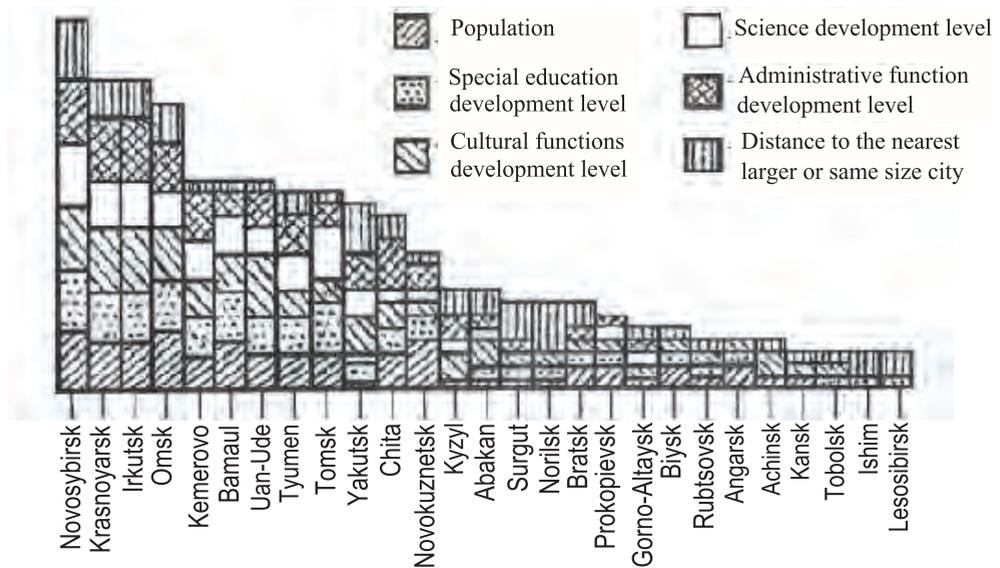


Fig. 3. Organizational potential of 27 Siberian cities calculated as the sum of 6 indices (ranks, in conditional points): number of population, levels of development of educational, cultural, research and administrative functions, and remoteness

It is worth mentioning that later, in early 2000s, Novosibirsk was even officially appointed the centre of the newly formed highest administrative unit – the Siberian Federal Okrug (district).

Three cities (Krasnoyarsk, Irkutsk and Omsk) showed the level of organizational potential obviously lower than that of Novosibirsk but significantly higher than other administrative centers.

## FINDINGS: TODAY'S PICTURE

Today, the conclusions of those-times research may seem a bit doubtful. An administrative reform is not such a current issue nowadays. And if its turn comes one day, it is probable that it will be built on other grounds – perhaps, similarly to the American approach, where administrative centres usually are not connected with any intellectual functions. Moreover, some indices are no more worth being used. Banking is much more important in our days than administration. To determine the innovative potential in our days, it would be necessary to measure the degree of public activity.

Thus the research from 1980s is now of rather historical significance, but it is methodologically valid, too.

Measuring and ranking the innovative potential of cities remains a current problem, though its aims and tasks have slightly changed. The investigations should be continued, taking into account new indices and groups of indices.

## References

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The ranking of cities according to their individual intellectual (innovative, organizational, creative, central, etc.) potential is actual and important for geographic studies in the epoch of post-industrialization. The results of such ranking can be applied in various aspects and directions of regional policy.

The very idea of such ranking seems to have been first formulated in France in the early 1960s. The research concerned was aimed at solving the problem of hyper-centralization in that country through forming 'metropoles d'équilibre' in the periphery, to counterbalance Paris. The task was to find the French cities which were ready to fulfill this role. Later, we have used this idea to rank Siberian

cities as to their administrative potential. The important innovation in methodology was introduction of a principally new index, crucial just for Siberia (although maybe less important in Europe). This index is the distance from the nearest comparable or obviously more significant city.

Prof. Anatol Jakobson, doctor of geographic sciences  
Irkutsk State Transport University, Russia  
e-mail: yakobson\_ay@irgups.ru