REGIONAL DIFFERENTIATION AND ACCORD OF THE DEVELOPMENT LEVEL OF THE MAIN BRANCHES OF FOOD ECONOMY DETERMINED BY A FACTOR ANALYTICAL MODEL

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In this present study agriculture, the food industry and the trade in the products of the food industry — according to the vertical aspect — are regarded as the homogeneous whole of the food economy. During the course of our work attempts were made to describe the accord in the development level of the main branches. The development level of the main branches had been determined earlier by exact methods.

In order to determine the development level the factoranalytical model was used. The main reason in our respect in choosing the method of factor-analysis was that the results gained by using this method proved to be a lot more reliable and gave more useful information than those used in professional circles before. The reliability of our methods was proved by the control of well-known and widespread old methods.

Factor-analysis is a method which can be used in multi-variable statistical analysis in a very wide circle and which started to become popular in various fields of economic sciences from the 1960's. The aim of factor-analysis is to create simple, hypothetical variables, so-called factors out of the relatively complicated network of factors of the problem under analysis. These simple factors reproduce and, in some respects, explain the statistical data involved in the analysis. Factoranalysis will then produce a complex factor (factors) which will contain the development level of the concrete regional unit.

While the other statistical methods usually analyse a given hypothesis, factor-analysis sets out to look for or create a hypothesis. It tries to set up a model which is free from accidental effects and shows the factors which indicate development. On the basis of this factor-model it is possible to determine and group the regional units according to their development.

For the analysis of the development of the food industry in regional units, counties were chosen as basic regional units. The reason for this choice is the accessibility of statistical data as well as the fact that today it is the county which represents a certain unit in national economic planning. During our analysis the counties which invested more live and materialized labour in the products of their food industry were considered to be more developed. The complex factors which indicate the state of development were chosen from the system of natural factors. It is a very important as well as a difficult task to choose the right natural factors. (In technical circles it is a question under debate.) Great efforts have to be made to find the factors which are in close connection with the development of the analysed branch of industry. We know that large administrative units cover certain internal, essential connections.

However, it seems to be reasonable that in order to achieve a deeper analysis of the problem the question must be approached from a macro-level first.

The static factors which reflect the economic state in 1972 were completed by dynamic factors. So the complex factor which reflects the state of development includes the tendency which has constantly been dominating during the past few years. (Later it became clear that the factors indicating the dynamism of development created a separate factor.)

Now we are going to give an outline of the factors that indicate the development of the food industry.

In our opinion the development of the food industry can be approached from an extensive and from an intensive side. The former includes the factors which represent the volume of the food industry; the latter refers to the technical level and development. All this has to be analysed from the point of view of both live and materialized labour. From the point of view of productivity the mass-production degree of production as well as the level of specialization are very important, too.

However, it is impossible to set up factors out of a part of the above-mentioned criteria in spite of their numeration, owing to the lack of statistical data. So, instead of the volume- and level-factors which we thought would have been optimal, we analysed the factors as follows:

1. *The number of people working in the food industry out of 1000 labourers in the othr socialist industrial branches; (1972)*
2. *The total number of workers in the socialist food industry; (1972)*
3. *The number of workers in the food industry in 1970 as a percentage of the 1965 figure;*
4. *The average number of workers in a food industry base; (1972).*
5. *Investment in the food industry as a percentage of the total industrial investment; (1972).*
6. *Food industry investment in 1000 Fts. per one labourer in the food industry; (1972).*
7. *Food industry investment per 1000 citizens in millions of Fts.; (1972).*
8. *Gross value of the fixed assets of the food industry in 1970 as a percentage of the 1963 figure.*
9. *Gross value of the fixed assets per citizen in the socialist food industry; (1972).*
10. *Gross value of the fixed assets of the food industry as a percentage of the gross value of all the industrial branches; (1972).*
11. *The capacity of the power-machines in the food industry as a percentage of the capacity of power-machines in all the industrial branches: (1972).*
12. *Power-machine capacity per 1000 food industry labourers in Kw; (1972).*
13. *Power-machine and electric engine capacity per citizen in the socialist food industry; (1972).*
14. *Electric energy consumption of the food industry as a percentage of the total industrial electric energy consumption; (1972).*
15. *Electric energy consumption in the food industry per 1000 labourers in the food industry: (1972).*
16. *Average monthly income of workers in the food industry; (1972).*

Later we applied factor-analysis to analyse the development of the food industry in our counties. In order to achieve our aim described in the preface, the counties were ordered and grouped according to the development of the food industry. (Fig. 1).

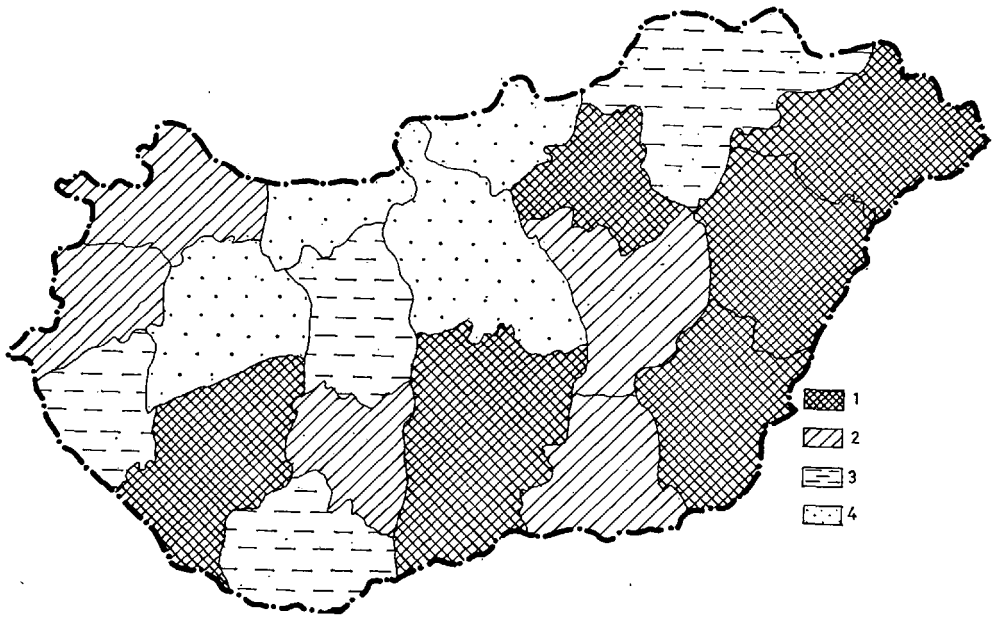

Fig. 1. Differentiation of the development level of the food industry in counties

1 = well developed
2 = developed
3 = medium developed
4 = underdeveloped

The double correlation connection of all the analysed factors is demonstrated in the figure reminiscent of a shessboard. The direction and the proximity of the connection is demonstrated by the surface of the circles and the squares. This supports the correctness of our natural factors. (Fig. 2).

Our first consequence referring to the factor-analytical model of the food industry is that both the first factor which represents complexity (main factor) and the one that represents unbalance characterize the totality of the analysed factors (45—50%). This must be emphasized because in the case of the transport of food the weight of the first factor which represents complexity is a lot smaller than that of the special factors.

Three natural factors are in very close connection with the first factor (the value of the factor-weight is al least 0,90): first, fifth and tenth factors; three others are in close connection with it (the value of the factor-weight is between 0,80 and 0,89): sixth, eleventh and fourteenth factors; and the following factors are in a connection of medium intensity with the first factor (the value of the factor-weight is between 0,51 and 0,79): second, fourth, ninth and thirteenth factors.

There is a very close connection between the second factor and the twelfth one; the connection between the second factor and the ninth, thirteenth, fifteenth and sixteenth factors is of medium intensity. There is a connection of medium intensity between the third factor and the seventh one; the connection of the fourth and fifth factors with the third and eighth factors is of medium intensity. There is no connection of medium or greater intensity in the case of the sixth and any other factors.

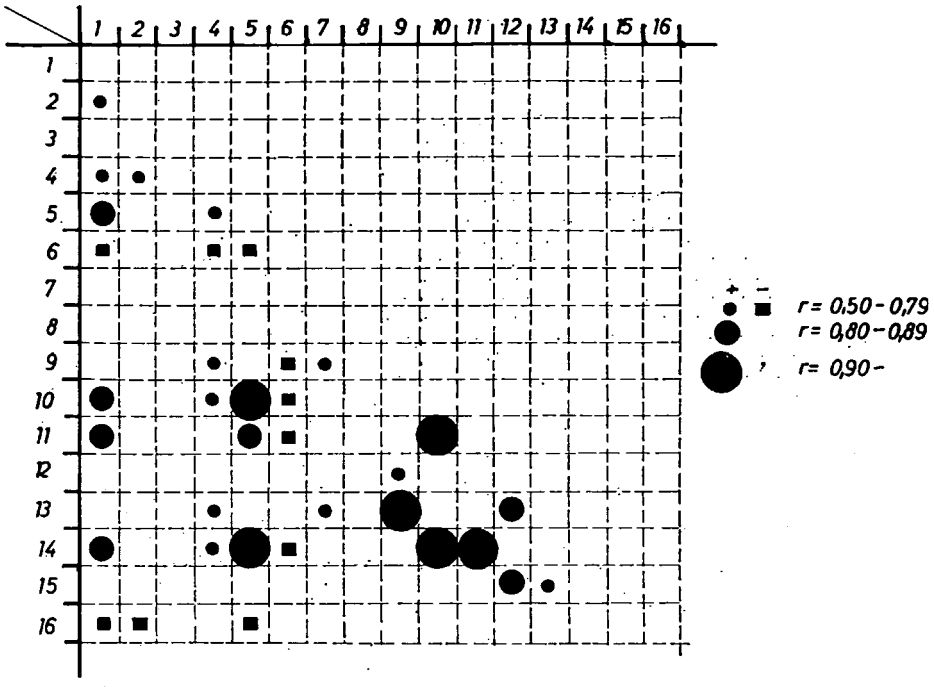

Fig. 2. Correlation matrix of the factors expressing the development of the food industry.

On the basis of the variables explained by the first factor this first factor can be considered as the factor of the proportion of the socialist food industry in the total industry. This means a comparison between the gross value of fixed assets in the food industry and that of the other industrial branches; between the capacity of power-machines in the food industry and that of the other industrial branches; between the electric energy consumption in the food industry and that of the other industrial branches; between the investment of the food industry and that of the other industrial branches; between the proportion of the labour forces in the food industry and the other industrial branches, etc.

The second factor gives further explanation of the partially explained factors like gross value of fixed assets per capita; capacity of power-machines and electric engines per capita in the socialist food industry. Furthermore, the second factor expresses the level of the factors of the food industry compared to the number of people working in the food industry, e.g. the capacity of the power-machines per 1000 employees; the electricity consumption per 1000 employees in the food industry, etc. On the basis of this the second factor is considered to be the factor of the characteristics of the food industry per capita as well as per 1000 employees in the food industry.

The third factor is in a connection of medium intensity with the investment of the food industry per 1000 capita in 1972. The fourth and fifth factors express the dynamism of the development of the food industry. This means factors like the gross

value of the fixed assets in the socialist food industry in 1970; the number of the employees in the food industry in 1970 compared to the 1965 figure.

As can be derived from the things described above, the development-level of the food industry in a county is determined by

a) the proportion of the food industry in all the industrial branches
b) the volume of the food industry per citizen/emloyee
c) investment in the food industry
d) the dynamism of the development of the food industry.

Among these the first is the most important.

While arranging the system of the natural factors efforts were made to complete the circle of the static factors with ones which express the dynamism of development. In spite of this we found that the development level of the food industry is determined most of all by the first two factors which means by static factors; the singificance of the factor which expresses the dynamism of the development is only of secondary importance. In our opinion this fact reinforces the conslusion we came to before: *the investments during the past years affect certain levels but do not have a crucial role in the state of the development level.*

In the course of our work the development level of the food industry underwent a many-sided analysis. With this manysided approach we tried to avoid deformations which could have been caused by the uncertainty of factors and statistical data, so that we could present a realistic picture of the development of our food industry.

Only the quantative elements of the development of the food industry were described by the above-enumerated 16 factors. In our opinion the development of the food industry has certain qualitative elements, too, which also have to be taken into consideration, such as

— the production of food required daily by the population of a given region;
— the processing of agricultural products for human and animal consumption in a given region within the optimal circle of transportation;
— the up-to-dateness and quality of the food industry products in the analysed area;
— the technical level of production of the food industry products;
— the share of the produced food industry products in the national and international division of labour;
— the share of the food industry in rational cooperation possibilities.

Similar analyses were done on the other two main branches of food economy, i.e. agriculture and food transport, as well as their connections with the whole industry, in order to present some characteristic features of the development of the three main branches of food economy.

The connection between the main factors indicating the development of the food industry as well as the total industry show a negative correlation which is slightly stronger than medium intensity ($r = -0{,}74$). This means that where the food industry is outstandingly developed, heavy and light industry is under-developed, and vice versa. The connection between agriculture and the food industry in the course of economic development is of special importance. Although the characteristic features and the rate of this connection can be analysed from various aspects, we concentrated on one aspect. It is the harmony between them in the field of development level. In the course of our analysis this correlation, which includes effects coming from

agriculture and the food industry, was considered uniform without considering any of these branches as primarlily important.

To measure the development level of agriculture the natural and outgrowth factors which are widely used in technical literature were used. To gain the synthetic factors factoranalysis was again applied. The values of the model set up this way can be interpreted properly and they have real equivalents. The result gained this way shows that the development level of agriculture in our counties is determined most of all by the following factors:

a) the intensity of agricultural production

b) the extensive situation of agricultural production

c) the rate of horticulture, grape- and fruit-growing. (Mention should be made of the fact that the model of factoranalysis does not separate the extensive and intensive factors of agricultural production completely. The intensive factors are interpreted by the first, while the extensive ones are interpreted by the second factor. This is of course in connection with the fact that the factors cannot be separated in practival agricultural production either. They are linked together and express the level and standard of agricultural production.)

Having given an outline of the development level of agriculture, we now attempt to analyse the already mentioned connection between agriculture and the food industry. The basis of this comparison is the order of rank gained by the main factors which express the development level of the seven main branches. (Fig. 1.)

Out of this order of ranks the result of the rank correlation +0,24 coefficient value was gained. This loose, positive correlation value is very small even if the decreasing effect of the branches which are based on the consumer market is not counted in comparison with the branches of the food industry which are raw material based.

Then our analysis was extended into the third sphere of the food economy verticum, the transport of food industry products. This very important component of food economy belonged to the neglected fields of research work. The analysis of this field promised much new information.

The problem of transport of food includes many categories some of which belong to the circle of provision such a the level of storage possibilities, warehouse supply; mechanization of unloading and internal conveyance of materials, the mechanization and capacity of cooling systems, transport conditions, the technical equipment and capacity of the shops, etc.

Mention should be made of the fet that while arranging the system of factors which are important in measuring the development level of food transport — owing to the lack of data — we had to diverge from the system of factors thought to be optimal.

Using the method of factor-analysis the regional units were ranked then they were put into different categories on the basis of the value of the main factor. (Fig. 1.) Having analysed the connection between the food industry and the transport of food we came to the conclusion that the value of the rank-correlation coefficient counted from the ranks set up by the main factors indicating the development of the seven main branches is —0,67. This negative correlation-coefficient value is partly affected by the fact that certain infra-structural elements belong to the wider interpretation of the transport of food, too. This is natural since it is clear that the regions which are developed infra-structurally belong to industrially developed regions. At the same

time we came to the conclusion that the value of the rank-correlation coefficient between the development of the food industry and that of the other industrial branches is —0,74. Anyway, the above-mentioned negative connections (between the food industry and the transport of food as well as between the food industry and the infrastructure) warn that certain accessory elements of the food industry should be developed. We think that the fact that ther is no regional harmony between the development of agriculture and the food industry and the development of agriculture and the food industry and that, moreover, the two factors show a contradictory tendency, could be a great obstacle in the way of the dynamic development of food economy. In order to diminish and eventually to solve this contradiction a concentrated deveopment is necessary in the fields of food transport and infra-structure in the industrially underdeveloped (agricultural) countires.

Summarizing our analysis on the harmony of the development leel of the main branches of the food industry we come to the conclusion that, in spite of the considerable development, the harmony is not satisfactory.

Experience shows that plant cultivation and live-stock breeding give an annually varying quatity of products to the food industry for processing, so to create the desired harmony is even more problematic. On the one hand the bottleneck of the food industry proves to be narrow, and on the other the under-utilization of the capacity increases the production costs. So the food industry is an industrial group in which hard efforts should be made to achieve a manifold work in order to obtain effectiveness and to create a flexible structure of products.

The example of sugar-refineries, where after the 90—110 day run other sorts of work are done, should be followed. Of course, such "help" is needed temporarily and in certain regions only.

The practical importance of the above-mentioned facts needs to be emphasized because the desires towards the food industry increased because of theincreasing demands of the population. At the same time the significance of food industry products is growing in foreign trade, too, and this problem also raises the question of the rapid development of the food industry.

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