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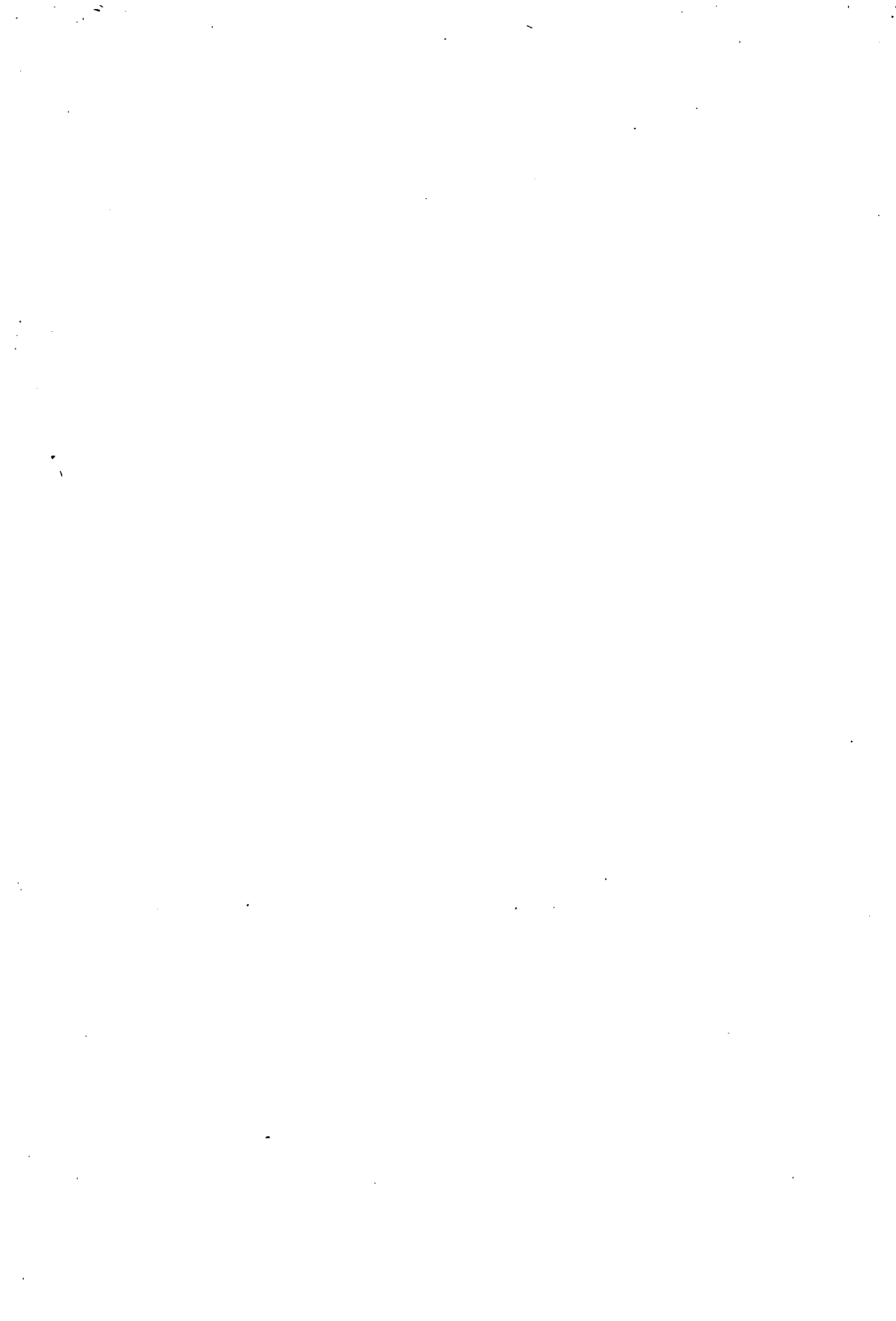
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TUDOMÁNYOS
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PREFACE

When the Hungarian Academy of Sciences founded the Research Institute of Industrial Economics in 1960, its activities were defined as follows: "The task of the Institute is to carry on research of general interest into industrial economics, to stimulate and help to coordinate industrial economic research, and to promote the development of scientific and practical industrial economic activity." Accordingly, the Institute has served, beside its own researches, the general development of its discipline, mediating between theory and practice, among other things through helping the activities of the Commission of Industrial Economics of the Hungarian Academy of Sciences.

The Institute publishes the quarterly *Ipargazdasági Szemle* (Review of Industrial Economics). The writings published in the periodical provide a comprehensive account of the results of the activities of workshops engaged in research into industrial and enterprise (business) economics, industrial policy and enterprise management, and other related topical problems. It provides information concerning international experiences in the discipline, industrial development, and related events of Hungarian scientific life. In order to make our research findings known in a wider circle, occasionally a separate English-language issue of the quarterly is published. In these publications a selection is offered of the most important analyses conducted in the recent past. It was in 1985 that the first such issue was published; the present volume is the second of the series.

In view of the fact that, owing to restrictions on the size of the volumes, the separate English publications can only offer a selection of our findings, in the section below we wish to give a more comprehensive picture of the Institute.

At first, the research of the Institute dealt with working time schedules, the utilization and management of fixed assets, and the development of technology and products. Later on the range of its areas of interest expanded and the points of emphasis changed in line with demand. Since the early sixties the research has been centred on productivity and efficiency. For many years the Institute was the Hungarian coordinator of the Productivity Working Group of the CMEA; since 1969 it has been Hungary's representative for the European Association of National Productivity Centres.

Since the early seventies, research work has gradually become centred on projects which aim to provide scientific foundations for industrial policy, and which attempt to clarify the room for manoeuvre open to industrial development policy. From the related projects of the recent past and those projected for the next few years, the following may be mentioned:

- industrial employment policy, with special regard to the relationship between employment and productivity, and the regional aspects of employment;
- investigation of the instruments and possibilities of an export-oriented industrial policy;

- impact of structural changes in industry, e.g. the effect of decentralization campaigns, as well as the role of small and medium size firms;
- reflection of world tendencies of technical progress in the Hungarian industry (e.g. robotization, biotechnology);
- structural adjustment and the role of the traditional industries in industrial development;
- industrial impacts of market competition and the conditions for its development and strengthening.

The changes taking place in the Hungarian economy and Hungarian economic policy; the actual and desirable growth of the autonomy and scope of manoeuvre for the enterprise sphere and the concomitant need for industrial economic research. Of the projects associated with the themes above, the following have recently been completed or are in the process of completion:

- theoretical clarification and practical tasks related to problems concerning quality improvement and the development of quality;
- saving of materials in design, construction, production and use, on enterprise and national levels;
- enterprise tasks related to structural adjustment, e.g. the possibilities for increasing the degree of processing or for making cutbacks;
- analysis of innovation processes in firms;
- evaluation of experiences with the new forms of enterprise management.

The Institute participates regularly in the medium and long-term planning of industrial development, and has conducted several research projects on corporate and sectoral planning, the practical experience associated with it, and the links between corporate and macroeconomic planning.

Since its inception, the Institute has placed great weight on interdisciplinary approaches and empirical investigations. In connection with the latter, it is the surveys relating to enterprise behaviour and intentions, that have become known and generally quoted sources. Such problems are difficult to investigate with traditional statistical instruments, (e.g. factors of productivity, judgement of technological progress, conditions of market competition).

The Institute maintains wide international contacts with related institutes in both East and West, as well as with international organizations (ECE, UNIDO, European Association of National Productivity Centres, CMEA-institutes, IIASA, etc.). It organizes international symposia, seminars, and conferences regularly - in fact the papers of two such conferences were also published in English:

Progress and Planning in Industry, Budapest, 1972, Akadémiai Kiadó.

Industrial Development and Industrial Policy, Budapest, 1979, Akadémiai Kiadó.

The following book titles, published in Hungarian on the basis of research carried out in the Institute, give a picture of its activity.

Hevesi, Gy., *Economic, Organizational and Social Problems of Continuous Working Time Schedules* (1966)

Topical Problems of the Management of Fixed Assets - Conference Papers (1968)

Kéri, T., *Flexibility of the Industrial Firm* (1972)

Botos, B., *Reckoning with Uncertainty in Investment Decisions of Industrial Enterprises* (1973)

Parányi, Gy. (ed.), *A Rapid Method for Disclosing Organizational Tasks* (1975)

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**A FEW ECONOMIC MANAGEMENT CONDITIONS FOR A FASTER
IMPROVEMENT OF PRODUCTIVITY**

ERZSÉBET VISZT

During the fifties and sixties productivity increased more rapidly in the Hungarian economy than in the advanced capitalist countries. In the seventies - more exactly, from 1973 onwards - the rate of productivity growth fell by 1.6-4.3 percentage points in the Western countries, whereas in Hungary it fell by only 0.3 per cent. Then, after 1978, this rate of decline also began to be more significant in Hungary.¹ To illustrate this fact, *Table 1* contains the three-year moving averages of labour productivity, fixed assets efficiency, and total productivity indices for the years 1976-86.

Table 1

**Three-year moving averages of labour productivity,
fixed assets efficiency, and total productivity
(1976-86)**

	Labour produc- tivity ^a	Fixed assets efficiency ^a	Total produc- tivity
1976-78	6.0	-2.4	3.1
1977-79	5.7	-2.3	2.6
1978-80	3.3	-5.2	0.0
1979-81	4.4	-5.0	0.7
1980-82	4.6	-3.9	1.3
1981-83	5.9	-3.2	2.8
1982-84	4.2	-2.7	1.5
1983-85	1.2	-4.5	1.0
1984-86	-0.5	-5.2	-1.9

Source: Author's computations based on: Major national economic processes 1986 (Budapest, 1987, Central Statistical Office).

^a Computed on the basis of the net industrial output.

¹ For more detail see [1].

The rate of increase of labour productivity fell in 1978 and again in 1983. Fixed assets efficiency deteriorated throughout the period, and since 1978 the decline has been considerable. Total productivity, computed as the weighted average of the two indices, stagnated between 1978-81, then improved a little, but afterwards became negative in the period 1983-86.

The unfavourable development of productivity is worrying not only from the aspect of economic growth and living standards, but also because of the adverse effect it has on the international competitiveness of the Hungarian economy.

The 'unit wage cost' index in the international comparisons of competitiveness reflects the combined development of labour productivity and wage levels. Wage rises in Hungary have exceeded the rise of labour productivity during the period under examination - except for 1979. The difference was particularly high in the years 1984 and 1985, being 3 and 11 percentage points, respectively. Such differences are not found in any of the advanced industrial countries. In fact, in those countries, the prevailing tendency shows diminishing difference between the rates of labour productivity and wage levels.

The competitiveness of Hungarian industry has in some way been affected by the processes taking place in the developing countries. The latter compensate their lower productivity rates by maintaining lower wage levels; at the same time the quality and technical standards of their products are higher than those of the Hungarian products, especially in the exporting sectors.

As a consequence of these processes, the international competitiveness of Hungarian industry is deteriorating not only in relation to the advanced industrial countries, but also in relation to certain developing countries, e.g. to the NIC's. Unfortunately, this statement holds true even if the other criteria of competitiveness are taken into account; the pattern of Hungarian export articles (i.e. mass products, medium quality), and the considerable amount of capital and time that would be needed to change such a pattern, add further issues to the other difficulties of this country.

Some of the Causes of the Unfavourable Development of Productivity

The productivity index rises if outputs computed at unchanged prices grow and/or inputs decrease or grow at a lower rate than output.

In the Hungarian economy, the dynamic of productivity - which includes labour productivity, fixed assets efficiency, and total productivity - is basically determined by the growth rate of outputs; the changes in inputs - especially of staff numbers and fixed assets - are relatively stable and independent of output.²

During the last ten years, it has been a first priority of Hungarian economic policy to stop the growth of Hungary's foreign debts and then to reduce them. This has been translated into practice by pursuing a policy of restrictions, i.e. putting a brake on investments, consumption, and socialist exports by means of central measures. About 90 per cent of the total industrial output was being spent in those fields. The rate of exports to the West is to be increased and these exports will make up about 10 per cent of industrial sales. This will not exert - on account of the figure being so low - any real encouraging effect on industrial output.

The unfavourable pattern of Hungarian industrial exports has added to the difficulties because the price level of the products which make up the greater part of exports first stabilized on the world market and then lowered a little - however, the domestic inputs of these products have been rising. By 1985, several Hun-

² For relevant computations see [2].

garian industrial enterprises had got into a situation in which their income in convertible currencies did not cover even the direct costs (wages and material) of their exports. Investment restrictions had a doubly adverse effect on productivity: the output of the sectors producing investment goods diminished, and the rate of technical progress also slowed down. Another problem was that there was no way to invest in new projects that could, potentially, help to raise productivity.

Although household consumption has shown a more favourable development than envisaged, the rate of those incomes (within the total income of households) that could be directly related to rising productivity has not risen. Thus in the years 1978-84, with the exception of 1981, the real wages of industrial workers fell in each year. The growth of consumption was enabled by the growth of those household incomes which derived from rising price levels, or social policy measures. Also coming into this category are those incomes which, though related to output, considerably exceeded wages that could be earned during an identical length of time in 'official' work (small enterprises, incomes earned in the private sector). Although real wages grew during 1985 and 1986, this fact could not stop the unfavourable tendency of labour productivity in the long run.

At the same time, inputs appeared to be rigid: no important changes occurred either in fixed assets, or in staff numbers, following the slow growth, and sometimes the decrease of industrial output. The rate of investments intended for machinery did not shift towards machinery investments, even after the restrictions. The rate of investments necessary for reducing live labour utilization and renewing technologies and products, compared to investments necessary for enlarging capacities, did not change much either. The rate of machinery and equipment modernization slowed down, partly because of the lower rate of modern imported machinery within machinery investments. At the same time, huge unused capacities emerged in certain fields of industry because of the decrease in production.

Labour inputs were, perhaps, even more irrational. The inflexibility of the labour market often prevents enterprises from reducing their staff at times of depression. An even higher barrier is presented by the rigid interpretation of full employment; Hungarian society and its institutional system are not prepared to accept that superfluous or incompetent labour should be dismissed. Enterprises rarely get involved in such conflicts. Safe employment is such a strong social priority that, in order to avoid any larger-scale dismissals, central measures are taken to rescue enterprises from bankruptcy.

The Place of Productivity among the Objectives and Means of Enterprises

In 1986 fifteen large industrial enterprises were investigated in order to find out about their major medium-term objectives, and about the resources they would use to achieve these. It was found that the enterprises' objectives were concerned mainly with output, while less attention was paid to the rate of input, i.e. to the input/output ratio. This statement is independent of which productivity index is considered: whether it is the traditional one of labour productivity, or the more complex one covering the aggregate input of several production factors. It was noticeable that the increase of profit stood at the top of the hierarchy of objectives (in 12 out of 15 cases) of the 7th five-year plan of the enterprises under examination; this was followed by objectives concerned with the increase of export earnings and production development (enlargement). These objectives were only in rare cases (in 3 out of 15) connected with the improvement of productivity and of fixed assets efficiency.

The narrow interpretation of productivity (i.e. that which is concerned with labour only), its low standards of measurement, and - indirectly - the scarcity of domestic or international comparative analyses, all suggest that enterprises do not consider the improvement of productivity to be an objective of importance. However, it is unrealistic to expect them to attach more importance to it as long as there is no direct relationship between profitability and productivity.

The unfavourable tendency of the productivity of Hungarian industry in recent years is, therefore, to be ascribed - on account of the above-mentioned factors - to an enterprise attitude which pays no particular attention to productivity. Enterprises do not see productivity as a condition of survival, and even less as a means of functioning profitably. In the future, a greater role must be assigned to productivity improvement among the objectives and resources of Hungarian industrial enterprises. It is not being said here that productivity improvement should be the main declared objective of enterprises; however, productivity does represent a national economic interest, and it is also a condition for increasing competitiveness. Therefore one of the fundamental ways of raising enterprise profitability is to increase labour productivity.

A Few Conditions for Improving Industrial Productivity

If the unfavourable tendency of productivity improvement goes on, the consequences for the social as well as economic development of Hungary will be serious. The worst of these concerns the obstruction of the improvement of international competitiveness. This will make it more difficult or even impossible to achieve the tasks of economic stabilization, to create foreign economic equilibrium, and to promote recovery. In the long run, and to an increasing extent, this would put a brake on the improvement of productivity, since it would lead to further necessary import restrictions.

It is, therefore, a condition of the improvement of the competitiveness of Hungarian industry that the level of productivity be raised - at least to such an extent that it is not left behind its major competitors in respect of the unit cost of output. A somewhat lower productivity level than that prevailing in the advanced industrial countries is still acceptable to Hungary, since the wage level is lower in Hungary than in those countries. The developing countries can quote favourable prices on the international market because of their low wage levels, so Hungary will have to compensate for this mainly by increasing her productivity.

It is, therefore, indispensable that in the coming decade labour productivity should rise faster in industry, and the deterioration of fixed assets efficiency should slow down. As a consequence, the rate of improvement of total productivity should also accelerate.

Taking such a course of development would also help to further the process of radical restructuring, and encourage understanding of the conflicts involved. In that case, the number of branches of manufactures and groups of products that are loss-making, or which contribute only slightly to the national income, or which have lost value for international trade, would diminish.

Therefore, a significant industrial policy turn is needed in the Hungarian economy. This turn engenders a further development of economic management and control in several fields.

In another study a detailed analysis was made of the major causes of low productivity, and this study also outlined the basic conditions and resources necessary for the improvement of the productivity of Hungarian industry. The study, which

provides a partial conception of long-range planning, made it clear that the following actions need to receive particular attention [3]:

1. Economic management and control organs must adopt an *economic policy which forces out a general improvement of the productivity (efficiency) standards*. This policy must be supported by allowing the market to exert its selective influence. In this way, those who work more efficiently would be given a larger scope for action, and those left behind would meet harsher conditions; if the latter failed to improve their performance, their existence would be threatened. Economic management and control organs should promote this process by means of several market-building steps. Of course, it is the progress of the reform itself that will play the major role in facilitating these advances. Under such circumstances, or in such partial fields of industry in which there can be no competition, other instruments - perhaps even direction from the centre - need to be used in order to encourage enterprises to raise their productivity level. These instruments must also be given attention, along with the conditions necessary for creating competition.

2. Among the measures that can help increase productivity, economic regulation is of outstanding importance. Special regard should be given to changes in the *tax reform and enterprise income regulation*. As a result of these changes the income position of enterprises could be more widely differentiated; it seems likely that in 1988, nearly 30 per cent of industrial enterprises will be facing a deteriorating financial position. However, the economic management and control organs must be strict with these enterprises: they must not, for example, grant any further allowances or preferences to them such that they can improve their income position without improving their cost/output ratio.³

The taxes which were introduced after 1980 and were aimed at rendering some of the production resources more expensive, failed to raise productivity: enterprises did not reach to them by reducing the unit cost of output.

The main reason for the failure of the policy is that enterprises have found it quite easy to shift their costs on to consumers. This is regardless of whether such costs are in the form increased taxes, or something else. This situation would change if sales conditions were not determined unilaterally by enterprises, and instead they were confronted with externally given demand constraints. These constraints would be shaped by domestic competitors, foreign (exports-imports) competition, and a limited money supply. The main point is that such constraints should not be loosened (i.e. the scope of movement should not be enlarged) - namely, the situation must be improved by the efforts of the enterprises.

3. It is extremely important for productivity (efficiency) that economic regulation be adjusted in such a way that it does not encourage enterprises to increase their staff or to retain superfluous staff. In recent years, with a view to increasing economic output, the economic management and control organs have assigned an important role to the regulation of salaries, applying different forms almost every year. Despite this apparent concern, none of the forms of the central regulation of salaries payable in enterprises have led to a rational management of staff numbers. For example, the form of income regulation which 'punished' the overstepping of the average level of wages paid out in the previous year, caused enterprises to increase the number of low-paid workers. Another form, the so-called 'salary level regulation', allowed the payment of higher wages to workers who achieved higher levels of performance; however, this was limited by the progressive

³ In the last two or three years, the number and amount of individual preferences and subsidies have grown considerably. Thus it is obvious that enterprises are able to improve the conditions of their functioning much better and faster through the acquisition of preferential treatment for themselves, rather than by measures taken within the enterprise to improve productivity (often an unpopular policy, in fact).

wage taxes imposed on enterprises, because these had the effect of discouraging higher performances. The application of yet another form of central income regulation can be no more than a temporary solution. What is needed is a policy which ensures a wide substitution of inputs, as well as the assertion of the total productivity of the production factors.

Wage liberalization, i.e. the lifting of the central regulation of wage payments by enterprises, is viable and will only add to the inflationary pressure if, within enterprises, a counter-interest develops to the raising of the wage costs. It is, therefore, important that the interests of enterprises shift from short-term profit and wage considerations towards more substantial profit considerations, and towards responsibility for enterprise assets. Experience has shown that it is primarily the top enterprise executives who need to be made interested in increasing enterprise assets.

4. The dual requirement of maintaining full employment and raising productivity may come into conflict, especially in a short perspective, and in certain fields of industry. Dismissals may cause troubles; nevertheless, these must be faced, and preparations must be made to find solutions as fast as possible, and also to minimize the disadvantages caused to the individual. Adequate forecasts of large-scale dismissals are needed in order that the central and regional administrative organs can help to place the labour released either by creating new jobs, or by some other means.

For the placement of the redundant staff that will appear as a consequence of restructuring and productivity improvement in industry, three fields are open in the long-run: 1. employment of increased numbers in the tertiary sector; 2. employment in industrial and other producing branches struggling with labour shortages; 3. employment in the growing private enterprise sphere. As for this last one, it seems that the establishment of independent small and medium enterprises - that can cover earlier unsatisfied demand - are to be supported through preferential taxation and capital allotment, especially in the regions which are struggling with employment difficulties.

One of the ways of finding a channel for redundant labour - applied also in the advanced industrial countries - is to reduce unemployment by *reducing the working hours*. Part-time employment and voluntary retirement before the normal age of retirement are possible ways of reducing worktime in Hungary, and would probably have a favourable impact. Their introduction on a large scale, however, would be an acceptable alternative only in the case of an overall improvement of income relations. In addition to the economic effect of a better utilization of labour, these ways are also socially important: to lower the level of female employment is a primary condition for raising care to a higher level, and may ease the burdens on the education and health networks.

5. In the future, more frequent changes are needed in the structure of industrial production, in technology, and in work organization. In addition, more efficient changes should also take place in the organizational system of industry. Those employed in industry - and this includes every group of workers - must *adapt themselves* to the changes. This represents a task which is many-sided and is addressed to many individuals. The probable changes themselves have not yet been fully assessed, but this is in fact a condition for preparing for them. The preparation for the changes affects the system of education and professional training, as well as the institutions and economic units which take part in adult training, adjustment training and extension training. Since what is involved is not only changes in professional knowledge, but also increased mobility in geographical, sectoral, hierarchical, and even in income positions, those who must take part in the preparations form a large circle.

In order to increase labour mobility, it is necessary to draw on central resources to promote training and the acquisition of new professional knowledge. Released

labour must be centrally aided so that it can find new employment; however, this does not amount to a guarantee that both the previous income level and the former field of activity will be engendered in the new employment.

6. The human factor must be made - more efficiently than before - to work towards the objectives of higher productivity and higher-quality performance. Although this involves *material incentives*, it is not only a question of incentives, but also a social question, in the broad sense. As long as poor performance is not universally condemned, and correct and high-quality performance is not universally appreciated, no progress can be made. Those activities requiring higher abilities, qualifications and responsibilities must be better rewarded - which means their value must be recognised in the level of basic wages they receive.

7. Since productivity depends on both the managers and the workers of an enterprise, their cooperation is indispensable in this field. In order that this cooperation can come about, both workers and managers must benefit from increased productivity; there are various solutions which could help to promote this process, including the numerous experiences of the market economies. The elaboration and recommendation of various useful wage and bonus systems, and the extension training of economic (labour) apparatuses, may help enterprises to develop their *system of incentives*.

8. Largely because of economic regulation anomalies, incomes earned in the first and in the second economy have grown so disproportionately as to make work in the latter a lot more advantageous than work in the former.⁴

The mutual relation of the first and the second economies could be made more balanced from the aspect of productivity (efficiency), *if the first economy were strengthened* in such a way that the requirements demanded by the economic environment confronting enterprises would force the latter to improve their productivity. Furthermore, higher individual performances in the first economy should be rewarded by higher incomes. If higher incomes could be earned in the first economy, albeit through more and better work, it would make employment in the first economy more advantageous than in the second. This is because the latter has certain disadvantages from the aspects of social welfare and health. In the long-range planning of development, increased attention must be paid to the conditions necessary for reducing these effects.

9. The economic and industrial policy directed at improving productivity (efficiency) must give priority to increasing the *capital needed for development*, and to encouraging savings.

It cannot be ignored that the countries that have achieved the best productivity results owe their success primarily to technological developments and a great number of innovations.

The fact that productivity has been reflected in such poor results in recent years in Hungary is largely due to the sectoral pattern of investments (preferences given to the development of the extractive industries), as well as to the general restriction of investments. Therefore, with a view to contributing to the development of a more favourable trend of Hungarian industrial productivity, the *investment pattern* must shift further in the direction of the manufacturing industries.

The implementation of these tasks can be started right now; their impact would surely be felt in the long run, and even in a few years' time. It is in this way that the negative processes that have, for several years, been strengthening and adversely affecting the competitiveness of industry, could be turned back.

⁴ In 1984, one investigation showed that the hourly wage paid out in the so-called 'enterprise economic workteams' for work of 20-50 per cent higher productivity, amounted to more than double the wage paid out for the same work in the main job. [4]

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ANALYSIS OF THE PRODUCTIVITY OF INTELLECTUAL WORKERS

LILLI BERKÓ

Twenty-two per cent of those employed in Hungarian industry - a number of approximately 300,000 - are qualified by labour statistics as intellectual workers. However, the level of their qualifications, the nature and intellectual content of the work they perform, and the degree of their creativity, cover a wide variety of forms. There are many who are involved in executive work, and there are those who play a determinant role in the organization and control of production, in market relations, in the development of information systems in the preparation of decisions, and last but not least, in research and development. The potential influence this group exerts on enterprise, and thereby on national economic capacity is, therefore, greater than their numerical presence. Information on the productivity of intellectual workers is relatively scarce. Computations of labour productivity are based, as a rule, on the total number of the employed, and manual workers are included within the computations. This is also the practice in Hungarian industrial economics. The productivity of intellectual work seems to have been neglected, because no objective and exact method exists for measuring it; this is particularly the case with reference to those taking part in material production.

Over the last fifteen years a certain tendency has been developing in the advanced industrial countries: namely, the sphere of those whose productivity is monitored and analysed has been constantly growing, in spite of the difficulties in finding reliable indices of measurement. It is true that the efforts are not aimed at elaborating exact numerical data, but at improving the work performance of those engaged in intellectual activities. The rise in the productivity of intellectual work is expressed by *indirect indicators* (e.g. reduced hours of administration, reduced length of time for the development of a new product, increased receipts from sales owing to the efficient work of one or another section of the enterprise, and favourable changes in the movement of labour. Characteristically, group performance is given more attention than individual performance. The reason for this is that in most intellectual activities, the performance within a group, a department, or a section are closely interrelated.

Although it is difficult to express the productivity of intellectual work directly on the basis of volume or value of output, *it is evident, if there is failure or performance in this field*. The recent tendency in the world market suggests that there is a strengthening demand for those products which are of high added value and which require a high intellectual work content for their production. In looking for the causes of the low and deteriorating competitiveness of Hungarian industrial products on the world market, and of the increasing technological gap, it appears that a connection exists between the above phenomenon and the fact that the creative energy of a great number of intellectual workers is not sufficiently used.

An analysis of the activities of intellectual workers is a timely research task because, beyond a few general statements, we do not have adequate knowledge of the productivity of the work performed by this group. This article presents the first results of an investigation which centred on the performance level and productivity of intellectual workers. These results are not only useful in themselves - they also provide the basis for further research work.

The Area Covered by the Investigation and the Method Used

Data were gathered from the *enterprises* of four different branches, and these cover the complete range of intellectual workers. In addition to elaborating the statistical data of enterprises, the investigation relied also on expert opinions and assessments. On the one hand, the top executives involved in the different intellectual areas spoke about the productivity of the work performed by the intellectual workers within their field, and about the general problems concerning the performance of these workers. On the other hand, the intellectual workers themselves answered our questions. Interviews were made with the top-level economic and technical executives of the enterprises, as well as with those of the commercial sections. In the case of large enterprises with factory units sited at different locations, the heads of those units were also interviewed.

Our investigation was pragmatic in the sense that the concept of productivity was handled with a certain degree of flexibility. Those interviewed were given freedom to interpret the productivity of intellectual workers as they thought best, both with regard to the given area and the specific activity in question; namely, *it was left to the interrogated to determine the content of the concept of productivity.*

In this article, the results of the investigation are presented in two parts, in conformity with the chosen method. First, the composition of the intellectual workers will be summarily presented on the basis of enterprise labour statistics; second, the more general facts concerning the productivity of this group will be set forth, based primarily on subjective opinions. Certain types of intellectual activity will be given special attention.

The Position of Intellectual Workers as Reflected by Statistics

The enterprises under examination belong to branches which require intellectual work for different purposes.

The textile industry (enterprises A and B) is not a highly intellectual-work-intensive branch, since its fundamental technologies have hardly changed over the centuries. *Intellectual investments into innovation* in the production of textiles are not primarily aimed at the modernization of technologies, but at the *continuous improvement of fashion, marketing, and strategies for the development of trademarks.*

The cosmetic and household chemical industry (enterprise C) is an intellectual-work-intensive special branch. The enterprises in this branch employ a large number of intellectual workers, and they are constantly exposed to the influences of the world market. Another important field of intellectual activity is the develop-

ment of a trade-mark strategy and, frequently, the establishment of the enterprise's own business network.

Mechanical engineering and, within it, the *engineering of machines for the chemical industry* (enterprise D) is highly intellectual-work-intensive. This is further enhanced by the fact that today electronics is fast becoming integrated into the manufacturing technologies. Consequently, new requirements are raised and there is the need for new types of qualification in the relevant areas of intellectual activity.

The data in *Table 1* are to be evaluated in light of the above-mentioned details.

For those enterprises under examination, and in accordance with the characteristics specified above, the proportion of intellectual workers is lowest in the textile industrial enterprises, highest in mechanical engineering, and the chemical industrial organization is situated in the middle. During the period under examination, the number of *intellectual workers fell* in three of the four enterprises, whereas their percentage share in the total staff number hardly changed.

Table 1

**The number of intellectual workers and their percentage share
in the total staff number
of the organizations examined in 1980 and 1986**

Enterprise	1980		1986	
	number	%	number	%
A (textile industry)	2909	22.1	2171	22.8
B (textile industry)	1044	19.8	951	21.2
C (chemical industry)	366	22.2	414	23.2
D (mechanical engineering)	322	39.2	229	37.0

Table 2 presents the composition of intellectual workers according to the labour statistics.

Table 2

**The number of intellectual workers and their percentage share
in the different staff groups in 1986**

Staff groups	Enterprises							
	A		B		C		D	
	number	%	number	%	number	%	number	%
Technical staff	738	34.0	335	35.2	154	37.2	83	36.2
Administration, trade, economic management	766	35.3	313	32.9	145	35.0	83	36.2
Health, culture	133	6.1	30	3.2	6	1.4	2	0.9
Accounting, finance, other transactions	534	24.6	273	28.7	109	26.4	61	26.7
Total	2171	100.0	951	100.0	414	100.0	229	100.0

A little over a third of the intellectual workers constitute the technical staff (the total industrial figure: 44.1 per cent); the proportion of intellectual workers in administration, economic management and trade is lower. The proportion of those engaged in accounting, finances, and other kinds of transaction make up (at nearly every place examined) about a quarter of the intellectual workers - thus representing approximately 5 per cent of the total staff number of enterprises.

With the enterprises examined, there seems to be a tendency in which *the proportion of the technical staff is decreasing, that of administrative and trade workers is growing, and the proportion of workers in accounting, finance, and other transactions is slowly decreasing.* The falling proportion of technical staff is held to be an 'unhealthy' process in the enterprises. The growth of the number of workers in administration and trade is partly explained by organizational reasons and partly, among other things, by the integration of new activities into the enterprise organization (for example, the establishment of an independent foreign trade section). The decline in the number of staff in accounting and finance is already a - albeit modest - sign of the employment of computer technology.

Staff figures grouped by *areas of activity* provide more information on the contents of the intellectual fields of work (see *Table 3*). According to these details, the majority of intellectual workers are engaged in the field of administration and management of economic affairs. There is a rather wide dispersion in the percentage share of the intellectual workers engaged in the sphere of direct production (even with regard to the enterprises belonging to the same sector). Finally it is a significant fact that of all the intellectual workers, only 2-7 per cent are engaged in research and development. Their share is *even narrower* (1-3 per cent) in respect of the total staff number of enterprises.

Table 3

**Distribution of intellectual workers
by fields of activity in 1986**

Field of activity	percentage			
	A	B	C	D
Research and development	4.6	2.0	7.0	7.4
Administration and economic management	42.1	65.4	57.0*	57.1
General administration	17.4	21.0	11.0*	4.4
Preparation and implementation of production	36.9	11.6	21.0*	31.1
Total	100.0	100.0	100.0	100.0

* factory units of regional location not included

About a quarter or a third of the intellectual workers have a *low level of qualification*: they have completed only the eight grades of the primary school. Although this rate is lowering as a national tendency, in 50 per cent of the enterprises in the sample the number of unqualified workers has somewhat grown in comparison with 1980. About one half (45-60 per cent) of the intellectual workers have medium-degree qualification. The rate of intellectuals holding university degrees displays considerable variety in the different sectors. As for a tend-

ency, the rate of the qualified group is rising, though as compared with the total number of enterprises, *the rate of professionals is still slight (3-8 per cent)*.

Finally it is to be noted that about a third of the intellectual workers hold some kind of managing post, whereas *two-thirds are subordinates*.

All considered, the statement can be made even upon basis of this relatively small sample that the majority of the 'intellectual workers' employed with the industrial enterprises have low qualifications, only a few are engaged in research and development of products and technologies, and also a small number carry on genuine economic activity.

Judgement of the Productivity of Intellectual Activity on the Enterprise's Part

In the course of the investigation, we could see that enterprises held the productivity of intellectual work to be an issue of importance. Even without exact numerical information, they feel that *considerable reserves lie hidden* in this field. Enterprise managers are, however, not interested in revealing and making use of these as yet, but only if "the worst comes to the worst." At the same time, many have formed the opinion that *the intellectual workers' performance cannot really go beyond the limits set by enterprises and economic conditions; therefore, they see only a slim chance of a 'break-through'*.

The fact that the average wages and average earnings of intellectual workers in industry are not much more than those of manual workers does not provide the incentive for higher performances on the part of the former. In 1986, for example, the average wages of intellectual workers exceeded those of manual workers by only 26 per cent, and their average earnings exceeded the latter by 29 per cent [2]. In addition, it seems that in this field the analyses made in preparation for the reform of the wages system have led to the worst disproportions in wage distribution [1].

The opinion of certain enterprise specialists also deserves attention - namely, that *the average productivity standards of manual and intellectual workers do not deviate to any considerable extent*. In other words, if there is 'overproduction' in the field of intellectual activities, it is first of all in research and development that staff numbers will be out; on the other hand, research and development might produce results which cannot be used by the enterprise. At present, both factors tend to cause conflicts; therefore enterprises try to avoid them.

The productivity of intellectual activities can be measured, in certain fields, by calculating the time spent in accomplishing some task. In enterprise practice, however, this *makes the object of bargaining dependent on time-limits*, thus rendering it impossible to evaluate changes in productivity. This is because the time available for the accomplishment of a given task does not primarily depend on the complexity and work-intensity of the task, but more on the power relations between managers and staff. On account of several circumstances taken together (workshop democracy, low wages, etc.), it is usually the subordinates that come out as winners. Thus a false picture is produced: someone observing the time-limit set by himself is immediately regarded as a good worker. The demoralizing and generally unfavourable effect of this on the productivity of intellectual workers is quite obvious.

Specialists placed importance on the product-centred management and control system because of the role it plays in raising the productivity of intellectual activities; put another way, the system enables the outputs and responsibilities of intellectual workers to be clearly seen.

The productivity of intellectual work was examined in detail in the following fields: production, research and development activities (product and manufacturing), and trading activities. The reason for the distinction is that the measuring of outputs and the contents of productivity are different in those fields.

Technical Staff Preparing and Controlling Production

Among the technical staff of industrial enterprises the largest group is usually that of workers engaged in production. Preparation and control of production are both basically 'supply' and 'auxiliary' activities. Thus they are total 'servants' of the production process. As enterprise specialists say, tasks just 'arise', i.e. they are rarely planned. Therefore, the time needed for their accomplishment is difficult to specify. In the fields of both preparation and control of production, the bulk of the work is represented by daily routine tasks. Implementation of these tasks could be promoted through the use of local computerized systems, instruments monitoring the production process, and other means of computer technology. In three out of four enterprises, however, the mechanization standards and methods of production control were qualified as being on the level of the 1930 and 50s.

Enterprise specialists expressed the opinion that *the lag in the introduction of modern production control methods* is not primarily due to a lack of money, but the consequence of a 'fundamentally conservative production philosophy'. "For several decades, production has been going on practically unchanged; at most, a few machines and certain products are replaced from time to time," said the financial manager of one of the large enterprises. Otherwise, it is to be noted that no substantial organizational changes have been effectuated in this field in any of the enterprises.

Intellectual workers engaged in the sphere of production are supposed to be motivated by certain special tasks the accomplishment of which qualifies them for a premium payment. The existing wages and incentive system is, however, inadequate for forcing out any growth of productivity, since the outworn production control method is incapable of calling forth any reserves.

A significant group represented in the production sphere is composed of the heads of factory units; as factory managers or technical directors, they are in fact members of the main headquarters of the enterprise. In practice, however, they are engaged, similarly to their staff described above, in providing adequate conditions of production. They spend a great deal of their energy on securing these conditions - conditions which would be taken for granted in a well-organized economy. Also, much of their time and intellectual capacity is absorbed by their trying to fulfil a lot of prescriptions, most of them outdated. Since the system of incentives applied to them is clearly quantity-oriented, *there is nothing, beyond the individual interest they take in their own subject, to make better use of their qualification and intellectual capital.*

Research and Development Activities

The staff engaged in *technological development* and in the implementation and control of investments are, in most cases, required to 'invent' solutions within a given time-limit; they also have to implement investments in time and within the prescribed expenditure. Their incentive is also attached to these factors. Special premium payments (or rewards by other rights above the basic wage) are directly attached to specific tasks. The earnings of this group, however, are not proportionate to the responsibility involved in the implementation of investments under the

existing economic conditions, nor do such earnings reflect the difficulties involved in dealing with certain forced solutions (in most cases the overcoming of material shortages).

In two of the enterprises, the situation of those engaged in research and development concerning mechanization and automation was spoken of as 'distressing'. For example, in the mechanical engineering enterprise covered by the investigation, the research and development staff were almost exclusively working on putting into operation a new robot and on repairing its functional disturbances. They had hardly any time left to work towards the solution of problems in some other fields. This was at a time when it was not even in the enterprise's interest to make use of the advantages offered by the robot, since it could achieve suitable economic results with the traditional methods (as the given level of productivity and costs).

Under such circumstances, therefore, even the most highly qualified researchers work at a low productivity level. The reason for this has nothing to do with their approach to work, but is directly related to a lot of factors quite beyond their control.

The more favourable cases seem to be the ones which show the way the intellectual capacity of those engaged in production development is turned to use at a time when investment resources, including those for machinery, are limited: this refers to about a third of the cases which have occurred in the last five years. The managing director of one enterprise expressed the following opinion: "intellectual performance is not truly expressed by the number of machines purchased and put into operation. Good use of our intellectual potential is indicated if we achieve success on the market." The managers of the enterprise regard the diversification of activities as a key to good market results and try to direct the energies of the staff engaged in production development towards this end, so that the latter are now working more like *entrepreneurs*.

The activities of the *research and development staff* have widely different aims and objectives in the different sectors. Of the manifold experiences we have gathered, the example of the textile designers will be given below; the artistic content of their work provides a good example of the difficulty of measuring output in intellectual spheres of activity.

Research and development staff in the textile industry are expected to be well-informed in matters of fashion, to anticipate customers' reactions, and to apply a high-level artistic knowledge in their work. Thus any judgement on the productivity of these activities must be based on different considerations. Enterprise managers assume that a designers' performance can be evaluated on the basis of the share of the sales of his 'own' designs within total sales. As against this, designers are of the opinion that indicators of this kind only refer to the ability to satisfy mass demand, and hardly reflect any artistic standards, or the designer's performance. International comparisons may also help to judge the level of performance: in countries with highly advanced textile industries, not even the biggest companies employ such large staffs of designers, as Hungarian enterprises do. One result of this is that the designers' wage (or the commission fees paid to outside designers) are much higher than the Hungarian specialists'.

The productivity of activities carried on in the research and development workshops should be viewed along with the low productivity of the phase that follows actual designing - namely, the preparation for printing phase; in this field not even the fundamental equipment is available to enterprises.

The lag in productivity in Hungary seems even bigger in an international comparison since computerized CAD/CAM systems are gradually being introduced in textile designing in the advanced industrial countries. These systems are today used in a relatively narrow circle, yet they are spreading fast and, according to specialists, if Hungary does not move now, her lag will be irrecoverable in 3-4

years. It is to be noted that the application of the said systems may render the textile designer's work unnecessary, since any capable worker can produce an unlimited number and variety of designs with their aid.

Trade Activities

In the trade sections, the *measuring of outputs* and the financial incentives for improving the outputs are *not impossible* in the majority of the existing areas of activity: commission on the volume sold should be guaranteed, and profitable business transactions should be rewarded, such as sales or purchase with more advantageous terms. Such a system, however, does not function, or functions only occasionally, with the enterprises under examination.

Enterprises are not particularly interested in evaluating their trade policy activities (market research, public relations, etc.). None of the enterprises applies, for example the methods, known from literature, which are apt to measure the success of publicity campaigns. The enterprise specialists interviewed believe that the productivity of their commercial staff is lower than that of such staff in the advanced industrial countries. They attribute this mainly to the poor standard of the equipment available (poor supply in computer technology, poor telephone system, etc.). The influence of trade activities on enterprise results is considered to be even worse than that of individual productivity, since the realization of contracts and business transactions in fact represents no more than a conjuncture of incalculable factors in the domestic market and the socialist market.

It seems that these considerations have had a significant role, because enterprise managers have formed the opinion that the commercial apparatus could be reduced by 20-40 per cent without causing any serious hindrance to the accomplishment of tasks. The remaining staff, however, could be expected to work with higher productivity only if there was a fundamental change in the existing wages system.

The organizational changes of recent years in the field of trade activities (for example, the establishment of so-called 'trade centres', the organization of the enterprise's own chain of stores, and the acquisition of export-import rights) have somewhat enlivened the market-production relationship. However, the enterprises have not yet made full use of the possibilities inherent in the new organizational forms.

Conclusions

The conclusions which can be drawn from the investigation are in conformity with the statement of another article [3] published in this volume.

Along with the general statement concerning poor productivity, it can be concluded that enterprises make little effort to improve the productivity of intellectual work. They do not really try to reduce the inputs of intellectual activities, nor do they attempt to improve the output of such activities. Enterprises should try to increase the output of that narrow sphere of intellectuals engaged in creative activities, since the productivity of the mass of enterprise workers also largely depends on it.

International trends show that the proportion of intellectual workers in the total workforce is steadily growing in the advanced industrial countries. As against this, the proportion of intellectual workers in the Hungarian industrial enterprises under

examination has not been rising. In fact, it has been stagnating over the last ten years and in the case of the more highly qualified - for example, engineers - it has even been decreasing in some areas. Several factors exert their influence in this field; for example, the advanced industrial countries have clearly recognized the key role of this group in industrial development. This is reflected by its growing share in the total number of those gainfully employed.

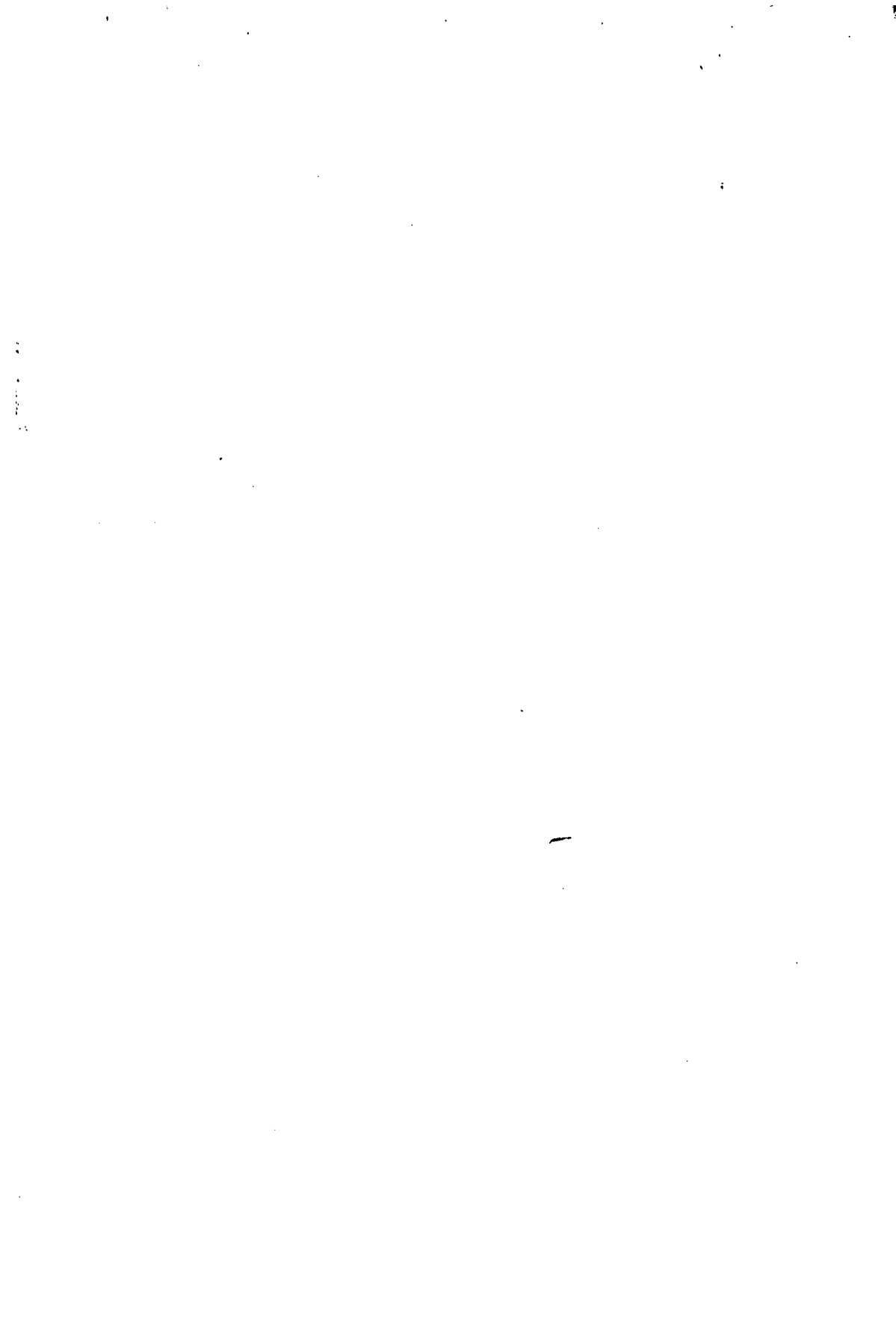
The unsatisfactory output of intellectual work contributes to the general problems of the social-economic environment. Therefore, any efforts made by the enterprises can only partly be expected to improve the performances of intellectual workers, and can only partly be expected to increase the average standards of productivity.

Our investigation has revealed that there are considerable reserves of unused intellectual capacity, especially with regard to utilization of working hours, of knowledge, and of abilities. Whether higher outputs can be achieved depends largely on *whether the Hungarian wages system can be transformed such a way that it can act as an incentive for productive, high-level, and creative activities.*

The present investigation has covered only a small group of the industrial staff. However, the output of this group is of a significance which goes beyond their percentage share in the total number of staff. Increased attention should be given to the various levels of economic management and control, and available resources should be made to serve management and control more directly than before. In addition, a more competitive environment will encourage enterprises to manage their intellectual capacities more rationally.

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STRUCTURAL TRANSFORMATION IN THE TRADITIONAL BRANCHES OF INDUSTRY

BALÁZS BOTOS

It is a common understanding among the economic politicians, practical experts and the theoreticians of industrial development that the acceleration of structural adjustment is one key-issue of the country's socio-economic development ('evolution') programme. This general agreement on the importance of the given task, however, does not at all imply that there are no debates about some further implications (e.g. about the actual scope of the task, the possibilities of ensuring the necessary resources or about the role of economic organizations and the state).

Various documents, publications and research reports on economic policy very often make mention of the role of the so-called key-industries (or 'locomotive industries') in the structural development of industry in general. They also point out the necessity of increasing the introduction of up-to-date technologies (including hi-tech) and the need to solve the problems of some of the industrial branches which are in a state of crisis. However, not so much has been said about those industries which are collectively termed as 'traditional'; also, their role in industrial development and structural adjustment has not been subject to any thorough analysis. In the following pages, I first attempt to make clear the necessarily emerging question of definition (which, then, are the 'traditional' branches of industry?), and to assess the weight these traditional branches represent within the whole of industry. Then I shall analyse the structural changes of the individual industrial branches as well as the factors preventing or impeding the speed of the changes. Finally, a comparison of individual cases, whose actual experiences permit a certain margin of generalization, will make it possible to draw conclusions and to formulate recommendations.

1. Traditional Branches and Other Branches of Industry

Analyses of the structure of industry emerging from abroad have long adopted the qualification of the progressiveness of industrial branches as the main criterion for grouping. However, considering that not one clearly defined and unambiguously measurable characteristic forms the foundation of such assessments, in the individual analyses groupings of various types may be found. Thus, for instance, the UN Industrial Development Organization (UNIDO) discerns raw-material-based, tra-

ditional, up-to-date and progressive branches, while various OECD studies refer to branches adopting high-technology and to branches being at medium and low technological levels. As is evident from these two examples, any categorization of this kind will primarily refer to the basic character of the technical and technological processes of the branches.

Bearing in mind what has been said above, among the traditional branches (that form the present research topic) we find industrial activities producing not too sophisticated end-products and not employing too complex basic technologies. Occasionally they are referred to as the Newtonian branches of industry, since the production processes - even now - can be explained by Newton's mechanical and physical theories. Various branches of light-industry, metallurgy, building materials industry, food industry and even certain sub-sectors of the machine- and chemical industries may all be regarded as such Newtonian branches. This little enumeration also clearly shows that although this categorization points to the basic technological characteristic, it in no way excludes either the production of up-to-date products or the adoption and use of modern technology and equipment.

Since the existence of the traditional branches - ever since the initial stages of industrialization - has been a characteristic of a number of individual countries, the attribute 'traditional' in most cases also indicates that the given country has industrial branches of long-standing. It follows from the greater possibilities of acquiring the technology, from the not too high professional requirements needed for applying these technologies, and also from the demands on infrastructure that the traditional branches are at this moment playing a remarkable role in the industrial development of countries now embarking on the road of industrialization. This tendency could have been observed during the early stages of industrialization of what are now highly industrialized countries.

The importance of the traditional branches can also be backed up by the statistical characteristics of the industrial structure. Branches of this type represent a considerable share in production, in the total number of the workforce, and in export figures. At the same time, the related data also prove - as is shown by the table presented below - that in the individual groups of countries the weight of these branches varies with the level of development.

Table 1

**Distribution of exports by the character of branches
(per cent)**

Group of branches	c o u n t r i e s		
	Developed capitalist	Recently industrialized	Other developing
Raw material-based	29	33	76
Traditional industries	30	46	18
New industries	41	21	6
Total	100	100	100

Source: [4]

What weight do the traditional branches have within Hungarian industry? To be sure, different indicators show their considerable share in industry, albeit to varying degrees. Almost one third of organizations ranking among the 100 largest in-

dustrial companies belong to branches of this type. Their weight in industrial exports also reflects - to some extent - their share in production. Their proportion is especially large in the non-clearing rouble-based trade (turnover); the share of the products of the traditional branches in direct exports rose from 38.2 per cent in 1984 to 40.4 per cent in 1986. (The corresponding figures for the clearing rouble-based exports were 33 per cent and 32 per cent respectively.)

In connection with the statistical data, however, due attention should be paid to the following facts:

- From time to time a feature which recurs in both the Hungarian and foreign special literature, is the wish to define the 'optimum' level of any given industrial structure. This, however, is nothing but an illusion, and it would be inappropriate to try to define this or that proportion of traditional branches in relation to a given developmental level.

- The term 'branch', in Hungarian statistical practice, is taken to mean a unit of categorization or classification which embraces a large number of organizations engaged in various economic activities. Such a unit is, for instance, the building materials industry and the machine industry. Hence it follows that the category 'branch', as used by me in this paper, is far from being precise in its strict statistical sense: i.e. the whole of the building materials industry may well be regarded as traditional, but this does not apply to the machine industry. The present research extends only to special branches or branches of production; thus I use the term 'branch' for the sake of simplicity.

- Although in several cases there is a considerable overlapping, the category of 'traditional' branches cannot be totally identified with branches which are 'lagging behind' or 'declining' or 'are in crisis'. For example, it is beyond doubt that within the industries of the developed countries, the share of the traditional branches is decreasing (thus they show signs of 'lagging behind'); however, the same branches may indicate - partly or wholly - a dynamic development. The textile industry of West Germany is a case in point: while the weight of most branches of the textile industry has lessened, there has been dynamic growth and development in the production of industrial (technical) textiles. It goes without saying that the reverse trend may also be true, i.e. the highly developed or 'high-tech' branches in any given country may also reach a state of crisis, either of a temporary or permanent nature.

2. Has the Structure Changed?

Forming part of the research programme TS/1-3 is the sub-programme "Technological development and structural adjustment in the individual branches of industry". This is being carried out by the Research Institute of Industrial Economics of the Hungarian Academy of Sciences. The Institute's former research efforts concerning industrial and structural policies (e.g. [17, 2, 3]) concentrated mainly on the principles and methods related to the shaping and transformation of the structure and with the desirable approaches for achieving those ends. Special emphasis was laid, among other things, on the necessity of selection. However, these analyses touched upon the possible directions of the main effort in general terms and did not go deeply into the issues involved.

The objective of the mentioned sub-programme is precisely to help decision-making - both in the medium and long run - related to structural policies. This is to be done by examining certain branches (their sub-branches and special branches) selected on the basis of well-defined criteria, and also by suggesting certain feasi-

ble frameworks for industrial policy - relative to the place and role of the various types of branches.

In the first phase of the research - which took place in the second half of 1986 and in 1987 - the analyses of the branches labelled as 'traditional' were taking place.¹ In the following, the experiences gained during these analyses will be summed up. Thus, for the time being, the question concerning the extent to which these results are suitable for generalization will be left open.

Various documents and analyses by experts unanimously agree on the detrimental role the slowness and lagging behind of structural adjustment have played in bringing about the difficult situation of the country's national economy. Although structural change was raised to the rank of an official requirement of economic policy one and a half decades ago, the facts indicate there has been little or no progress in this direction. Thus it is not surprising that in the case of most branches involved in the present research, it is not so much the results of structural adjustment that are of interest, but the specific circumstances that have retarded progress.

Let us take a look first at the tendencies of the structural changes which have evolved so far.

Over the past fifteen years, rather marked changes have taken place in the product structure of the *paint and varnish industry*. This is also shown by the facts indicated in *Table 2*.

Table 2

Product structure of the paint and varnish industry

Groups of product	(in percentage)		
	1970	1978	1985
Oil paints	36	17	5
Alkid, lacquer, enamel (to be stoved)	37	38	43
Vinyl-copolymer, epoxy, enamel (colourless)	13	24	24
Watered dispersive	3	12	23
Cellulose and derivates	9	9	5
Asphalt, bitumen	2	-	-
Total	100	100	100

As can be seen, the ratio of paint-types which are now considered obsolete (oil paints and cellulose derivates) has significantly decreased, while there has been a corresponding increase in the weight of the groups of up-to-date products (synthetic, watered dispersive). This trend of changes corresponds to what was going on in the Western European countries 5 to 10 years ago. (The difference between Hungary and the West is even greater in the up-to-dateness of supply on the market,

¹ This research is going on under the author's direction, and it involves several experts within and without the Institute. On the experiences gained in the given fields reports have been published in comprehensive studies [6, 7, 8, 9] as well as in other publications. In 1988 investigations in further branches (preserves and furniture) were finished.

but this has other reasons: backwardness of packing techniques, presentation, servicing, etc.) However, all in all, this picture shows certain considerable changes in the structure of products and also demonstrates the very favourable market position of this branch - although the almost permanent shortage has to be taken into consideration as well.

The modernization of the product structure is a high-priority task for the *agricultural machine industry* too. This is justified partly by what has been up to now the slow pace of modernization, and partly by the import opportunities, which have narrowed down in recent years. From this aspect the role of international cooperation is very significant, although in respect of its effects it is not always definitely positive.

Changes in the product structure of the *wool industry* are illustrated in the following data.

Table 3

Production of textile goods in the wool industry

	(in million square metres)			
	1970	1975	1980	1985
Woollen, wool-type cloths	37.3	39.0	42.7	37.0
Of this: clothing material	25.6	27.4	29.2	25.6
Of the clothing material:				
combed	15.8	21.2	21.2	20.0
carded	9.8	6.2	8.0	5.6
Knitted fabrics	0.2	2.7	4.0	7.0

From the aspect of the basic materials used and the technologies applied, the so-called 'combed cloth' is 'more valuable' than the carded cloth. Thus the growing share of the former within total production seems to be favourable. Within the family of combed cloth the ratio of more labour- and basic material-intensive products (e.g. pure wool) has also been increasing; the production of carded materials has continued to decrease, although this process is judged in different ways by different textile experts. For instance, some companies want to increase the volume of production of these products. The growing ratio of the knitted-type fabrics can mainly be explained by the many-sidedness of the economy and the demand for economic stabilization. However, the 'large-scale' changes in the product structure as outlined here are - in themselves - insufficient to qualify the structural adjustment of the branch over the past decade as a complete success. The textile industry, as a 'fashionable' branch, must day by day prove its competitiveness in the market. This is determined by the quality and modishness of its individual products rather than by the ratio of certain groups of products. Since 85 per cent of the products of the textile industry have been - year after year - put on the market in an unchanged form, the majority of the cloths are heavy, their composition never varies, and their colour and pattern diversification can hardly cope with the fashion: thus the structural changes carried out so far cannot be considered sufficient.

Changes in the product structure of the *brick- and tile-industry* should be evaluated in the light of two factors. The first is the limited convertibility of the equipment and basic materials used in production; the second concerns the fact that the related market was, up to 1984, quite obviously dominated by the demand

side. Considering the effects of these two factors, it is not surprising that the product structure of this branch of industry hardly changed at all between 1970 and 1980. However, at the beginning of the eighties there were signs that a degree of re-shaping was taking place. This is illustrated by the proportions of the production of manual bricklaying materials and roofing materials as shown below.

Table 4

Production of bricklaying and roofing materials

	(in percentage)	
	1980	1985
a/ Manual bricklaying materials		
Baked bricks	90.0	81.6
Gas concrete (beton)	6.1	15.7
Manual concrete (beton) building elements	3.9	2.7
Total	100.0	100.0
b/ Roofing materials		
Baked roofing tiles	39.8	31.1
Plane slate	27.3	18.4
Corrugated slate	32.9	30.1
Concrete tiles	-	20.4
Total	100.0	100.0

On account of the appearance of substitute materials (e.g. gas concrete /beton/ building blocks and concrete tiles), of the decrease of global demand as well as of the introduction of new legal measures relative to building (e.g. to heat-insulation), structural change has become a vital question for this branch. Consequently, the ratio (quantity of production) of the baked-type products has decreased while the share of other groups of products has increased. In the future, the crucial issue facing this branch is the trend in market relations. If the shortage situation in late 1984 and early 1987 is seen as transitional, then this branch will only be able to retain its market position with more up-to-date and superior quality products. If, however, the demand continues to exceed the supply, significant changes seem to be unlikely.

The tendencies observed on the basis of examinations of the four industrial branches mentioned above largely correspond to other general industrial experiences: undoubtedly there have been certain changes in the production structure but these changes are far from being sufficient - either from a quantitative or a qualitative point of view - for laying the foundations for a process of 'evolution'. The fundamental problems do not lie in the lack of movement or change, but in the fact that the changes - albeit having taken advantage of the shortcomings of the present economic environment - have tended to proceed against the tide of minor obstacles. Thus they have hardly been able to change product structure from the aspects of modernization and cost-effectiveness. What is it, then, that could encourage and enable the industrial companies to move in a positive direction? It seems that market impulses are the main factors for answering this question. However, their existence in the branches examined here is very contradictory.

In the domestic market of the *paint and varnish industry*, certain features arising from the shortage situation have been predominant up to now. The domestic industry fails to meet the demands, yet the import of finished products is - for monetary reasons - at a minimum level. This branch of industry scarcely participates in the international division of labour, and thus the demands of external markets do not have the effect of stimulating producers.

It is a fact that two companies account for 90 per cent of domestic production in this field. Despite their flexible and convertible production capacity, their product pattern is very similar and, in any case, the resulting competitive situation cannot make its effect felt because of the permanent shortage.

A shortage situation, and within that the lack of a diversified product range, also characterizes the domestic market of the *agricultural machine industry*. Despite the larger number of companies in this field, it is not accurate to speak of a real competition, since the 'profiles' of production were distributed among the companies back at the time of the trust-based mode of organization. Added to this, imports do not represent any competition in this field since most of the imported machinery is not produced at all in Hungary, and the shortage of convertible currencies increasingly puts restraints on imports.

Since some 45 per cent of the total production of this branch is exported, one might be inclined to suppose that this might encourage more up-to-date and more competitive production. However, this effect is almost cancelled out by the fact that the bulk of exports go to the socialist countries where - similarly - it is only the meeting of quantitative demands that really counts. On the other hand, exports directed to the market-oriented countries are, as a rule, based on cooperation agreements. Although, in some small way, this helps to enhance competitiveness, the majority of such exports amount to nothing more than the delivery of spare parts or partial units to relatively stable markets.

The existence of six companies with a more or less identical product pattern may suggest that there is some domestic competition in the *wool-industry*. The mere facts, however, do not indicate any serious competition. This once again confirms that the existence of a larger number of companies in one and the same field is, in itself, still not a sufficient condition for the emergence of competition. [10]

Thus there is no real competition because its effect - i.e. the regulation of supply and demand - on the companies has only recently come into full display. Due to the lack of competition practically any product can be sold. Along with competition, it is also necessary to refer to the fact that - on account of identical troubles - the survival of companies is not ensured by surpassing competitors, but by being firm in the 'competition' with the official regulations - or rather in 'fighting' them.

The participation of the wool industry in the international division of labour means that a real value judgement is conveyed by the market to the companies. The ratio of the direct export, however, is not so high as to be able to urge on a more intensive structural change than the one taking place at present. If other troubles are considered along with the import possibilities of basic materials, a more radical change is seen by the companies to be possible only within very narrow bounds.

Except for the past one or two years, the *brick- and tile-industry* has probably felt less (perhaps even less than the other three branches under examination) pressure from the market to make its product structure more up-to-date. In the case of the products of the brick- and tile-industry, external markets do not play a decisive role and in the home market they are able to sell practically every product. Thus the existence of independent companies has failed to bring about a competitive situation, since the territorial (regional) division of markets was clearly de-

fined from the beginning. Since 1985 the role of the demand factors has been enhanced. Should the effect of the above-outlined tendencies turn out to be lasting, it could contribute to the speeding-up of structural modernization.

3. Incentives and Obstacles to Structural Adjustment

To sum up, it can be said that neither the domestic market, nor participation in the international division of labour have been able to encourage the examined branches to renew - continuously and *in merito* - their production structure. Missing are all the impulses and incentives which could create an economic environment in which the existence or non-existence of the producers depends heavily on the innovative, creative and dynamic character of their development policy. According to international experiences, the three fundamental sources of a company's creative conduct consist of the following:

- an adequate framework for the development of economic (industrial) policy;
- an adequate organizational system;
- competition in the domestic market and participation in the international division of labour.

Within these individual factors, the primary task of industrial policy is to create environmental conditions which urge or even press upon a company a type of conduct which strives for permanent renewal. An important part of this process is the formation of channels which are at an optimum level between basic research and its industrial applications. Moreover, it is also necessary to intensify (or if need so arises to modify) all the signals and bonds which have an effect on technological development on the part of the market.

What type of company organization seems to be most helpful in promoting structural renewal? Three characteristics seem to stand out as the most important:

- a) it should have a centre which is of an oligopolic character, which represents an appropriate order to magnitude, and which is not only the 'producer' of most innovations, but also the external source of 'spin-off' effects;
- b) it should have a network of small and medium-sized enterprises which are highly responsive to new trends and innovations;
- c) it should ensure and encourage the birth of new enterprises, or bring about the closing down of non-competitive ones.

The existence and effects of such organizational characteristics obviously have a connection with the existence of an adequate system of regulators - for example, with the financial mechanisms, which have not been mentioned here specifically but whose importance is beyond doubt.

As has already been mentioned, the most important force propelling the renewal of the product structure is the existence of competition on the market. It is evident, however, that competition which relies merely on the domestic market is impossible in Hungary; therefore, from this aspect as well, openness of the highest degree possible is an absolute necessity, and the same applies to the country's involvement in the international division of labour.

Examining the extent to which the above discussed conditions have been able to produce an effect on the structural modernization of the industrial branches dealt with above, the actual situation presents the picture shown in *Table 5*. (It has to be emphasized that this evaluation points out the characteristic tendencies arising from the nature of the given factors.)

Notwithstanding the fact that these qualifications are to some extent subjective,

Table 5

Conditions of innovation

	Paint and varnish industry			Agricultural machine industry			Wool industry			Brick and tile industry		
	1	2	3	1	2	3	1	2	3	1	2	3
1. Inspirative macro-economic policy		x			x			x				x
2. Adequate organizational framework												
- strong centre		x				x			x			x
- small and medium-sized companies			x		x			x				x
- birth and cessation of companies			x			x			x			x
3. Necessity of competition												
- domestic competition			x			x		x			x	
- international competition			x			x		x				x

Legend: 1 - strong positive effect;
 2 - weak positive effect;
 3 - no effect or counter-effect

the table reveals much about the condition-systems of the structural adjustment of the industrial branches discussed: none of the branches under examination provide any evidence that any of the factors show strong positive effects and this by itself is a warning signal. A characteristic of most cases is the lack of proper conditions; thus the incentives are weak or, in practice, constitute the impeding forces, i.e. it is their negative effects which prevail.

The intentions of *economic policy* unambiguously aim at encouraging a more creative, innovative way of thinking, and a more dynamic development policy. However, as has been confirmed by the findings of several other studies, industrial companies have - as a rule - experienced the reverse.

Organizational structures do not present a particularly favourable picture either. Although the paint and varnish industry has a 'centre', its 'strength' is highly contestable. In the field of the agricultural machine industry, considerable organizational changes took place a few years ago (along with the disintegration of trusts). However, since these changes were based on a central decision, they were unable to lead to the formation of the desirable organizational structure. (This also proved that, in the given case, a campaign of decentralization is likely to be just as ineffective as a forced concentration.) At the time of the present research project, the wool industry represented a highly concentrated form of company organization. The six companies - each rather large compared to other branches - worked, with several other plants, under centralized direction. Since then the situation has changed to a certain extent. According to certain proposals (to which we also contributed) several companies have developed more flexible organizational forms (subsidiary and joint stock companies) and up-to-date patterns of management. Although the brick and tile industry actually has a centre, one task of which is precisely to concentrate the possible technological development efforts, the other two conditions are fulfilled only nominally. (The modernization of the organizational structure has been placed on the agenda of this branch too.)

All in all, what is really missing is the *competitive situation*. Internal competition is weak in each of the branches, while external competition in both the paint and varnish industry and the brick and tile industry encourages structural change only to a minimum degree. External competition in the wool industry makes its effect felt only rather indirectly. The lack of internal competition is caused not so much by the monopolistic position itself, but by the division of markets and 'profiles' (product patterns). The causes of the lack of participation in the international division of labour, as has been seen, vary from one branch to another, but its effect is just the same.

If the supply of material resources for structural change are also taken into account (and this question has not been dealt with separately here), the situation offers an even more unfavourable picture. Each of the discussed branches has run into heavy debts, and they hardly have any free financial means for development. Owing to import restrictions, maintaining adequate quantitative and technological levels of the machinery has become a serious difficulty, while efficient exploitation of existing capacities is made difficult by the meagre funds available for importing basic materials. Occasionally the quantitative lack of manpower and, in some cases, the lack of properly skilled workers, lead to the retardation of progress.

These facts do not constitute excuses, but they help to explain why the examined fields have not succeeded in attaining more effective structural changes.

4. Questions Concerning the Issue of Rationalization²

The structural renewal of the processing industries requires the input of considerable resources. The greater part of these funds will have to be raised by the industry itself. On account of this and also because of the absolute necessity of improving effectiveness, the available resources need to be allocated to such places where the optimum returns may be expected. The possibilities for this may be ensured - among other things - by rationalization. Rationalization may concern activities, factories, industrial plants, companies or even the whole of a branch of industry.

Of the industries examined here, in the cases of the paint and varnish industry and the brick and tile industry the elimination of activities does not come into question, even in principle. Both branches produce goods which are difficult and expensive to transport. Therefore, they participate in the international division of labour to a small extent only. Moreover, no country is able to dispense with its domestic producers. In the other two branches, the wool industry and the agricultural machine industry, their rationalization (i.e. their elimination) is conceivable in principle, but it has no reality, and probably it would not be rational at all. Apart from the time-honoured traditions of their production, their existence is also justified by the following facts:

- owing to hard-currency restrictions their products cannot be obtained through importation;
- both branches are significant exporters (either indirect or direct);
- the wool industry possesses a significant domestic raw material basis;
- the development of agriculture and - increasingly - the development of biotechnology are inseparable from the existence of a domestic machine industry basis.

All this, however, does not imply that in each of the examined industries the maintenance of the present capacities is entirely justifiable. According to our analyses, e.g. in the field of the wool industry, the available capacities are significantly under-utilized, and four or five companies would suffice as against the present six.³ However, although there seems to be no doubt about the need for rationalization, the exact method of bringing it about is more open to question.

Relying on the principle of rationality, first the least productive plants at the lowest technological level ought to be closed. Under the present conditions and organizational structure of the wool industry, this is hardly possible. The particular interests of the individual companies and those of the branch as a whole are not always identical; furthermore, the mechanism through which these interests might approach one another has not yet been worked out.

It may also be regarded essentially as a form of rationalization that the companies which have already been diversified tend to spend an increasingly significant part of their resources on works other than their basic activity. Out of the six textile companies, three are gradually increasing their involvement in other activi-

2 'Rationalization' is used here to mean the reduction of capacity in order to bring about greater efficiency in the given industry.

3 It should be emphasized that similarly to the 'optimum' structure, the 'optimum' order of magnitude of the individual branches cannot be defined either. Therefore, it is not that a country of a size similar to Hungary could not maintain six companies in the wool industry, but it has to be underlined that under the present conditions of the market, profitability and other things, the existing capacities cannot be utilized rationally.

ties (ready-made goods, knitted fabrics). The rationality behind these endeavours can hardly be disputed since the profitability of these activities is much higher than that of the production of cloth; at the same time they can take more advantage of their vertical integration.

Yet, after taking all these things into consideration, there still remains the need for a co-ordinated renewal programme appropriate for this branch. Beside the measures which have been taken to promote cooperation both within the company and between the individual companies (e.g. the establishment of a joint foreign trade enterprise), there are also some that invariably expect the top management of industry to work out the feasible directions of the 'evolvement' programme and to ensure that there are the funds necessary for structural change. This, however, cannot happen - besides it would not, in all likelihood, yield the desired result. Experiences drawn from the economic rehabilitations carried out under central direction and with considerable government support (e.g. in the case of iron metallurgy and mining), also confirm that it is much more practicable to seek solutions involving greater response to the judgements of the market and relying more heavily on the given organization's own resources.

However, the fact that rationalization within the wool industry - which is really desirable and has been formulated even in the government conception - hardly appears in the strategic conceptions of the companies, shows that the tackling of this problem cannot be expected from isolated company decisions. There is a need anyway:

- to establish a realistic system of property interest, and simultaneously to involve the banking sphere more intensively;
- to continue the ongoing modernization of the organizational structure of the branch;
- to increase the number of productive enterprises;
- to set up an independent professional industrial association.

It seems to be inevitable that there will be a rationalization of the capacities in the brick and tile industry too. To define the desirable degree of rationalization is still difficult at present, but it is quite clear that those plants which apply the traditional technologies and are unable to produce up-to-date products should be closed. Rationalization in this branch should also imply an adequate modernization of the organizational structure, although the latter is justified primarily by the improvement of the interest relations, as well as by the strengthening of the entrepreneurial way of thinking.

In the two other branches a more significant rationalization is not necessary, especially with regard to unsatisfied needs. However, it is necessary, as with any other branch of industry, to carry out changes in the product pattern at a healthy rate, i.e. to gradually replace the obsolete, non-competitive and uneconomical products by new ones. At the same time it should be emphasized that the necessity of rationalization does not by itself qualify the situation of any given branch. For instance, while it is practicable to narrow down the capacities in the fields of the wool industry and the brick and tile industry, this is not the case within the agricultural machine industry and the paint and varnish industry. However, this does not imply that the former two branches are worse performers than the latter ones, or that they are less important. In the given cases the impossibility of meeting the demand may reflect much more serious economic faults than the existence of already superfluous capacities. Changing structures of demand, technological development, changes in living standards and lifestyles, and several other factors may lead to a state in which certain capacities become superfluous. Thus, in the case of the traditional branches, development and rationalization should be handled as two closely interrelated tasks of the economy.

5. Conclusions and Further Tasks

Without over-estimating the possibility of generalizing the experiences gained through the examination of the discussed industrial branches, it seems to be worth underlining the lessons which may contribute to making our structural adjustment policy more effective.

1. The traditional character of an industry should not imply its under-estimation in the process of structural adjustment. The continuous change of product structure is just as urgent in the traditional branches as it is in the progressive industries. This seemingly evident requirement should be emphasized mainly because, in the course of the research, we frequently heard opinions which suggested that there was no possibility of speeding up the structural change or adjustment in these branches because of their traditional character, the long life-span of their technologies, and the characteristics of their product pattern.

2. However, it is also true that in many areas of the traditional industries it is very difficult to be precise about the actual form of the structural changes necessary. Thus, with the absence of fixed objectives, it would also be difficult to render an account of the changes. In quite a few fields of the textile and garment industry it is extremely difficult to draw the line between old and new products. The same applies to more than one sub-branch of the building materials industry.

Reference should be made here to another problem: namely, that even if a statistically verifiable change in the product structure is possible, this does not indicate that there has been an intensification of structural adjustment. As has been confirmed by the examples analysed here, large-scale structural changes, which could be 'spotted' statistically or by data, did not imply a simultaneous improvement of the competitiveness and effectiveness of the given branch. Therefore, special care should be taken not to qualify branches or companies on this basis, and even more care should be taken not to grant preferences on the grounds of similar viewpoints.

3. The weight of the individual traditional branches has already been discussed. In addition to this, it is also very important to place a strong emphasis on the role these branches may play in the overall structural change and in the whole 'evolution' programme. The importance needs to be underlined because it is rather common to hear the opinion, even now, that the possibilities for a breakthrough of the country's industry will only occur in the sphere of the progressive industries, i.e. those which have adopted the most up-to-date technologies. According to this opinion, the traditional branches represent a kind of necessary evil, and they should be maintained only so long as there are no other more up-to-date branches to replace them.

In opposition to this, the findings of our investigation confirm the possibility or even necessity of speaking of the 'locomotive' (propelling) role of certain traditional branches with regard to the country's capabilities and level of development. If we can make advances in these fields against our competitors, then we might realize certain comparative advantages which could help to increase the effectiveness of the country's adjustment to the conditions of the external economy.

All this is especially relevant if the industrial 'verticals' lend themselves to realistic development, and are then taken into consideration together, rather than being regarded as isolated activities and separated branches. Without going beyond the scope of this investigation, our examples do suggest some possible chains, e.g. sheep-breeding - production of woollen textiles - ready-made woollen products in the case of the wool industry; and machine production - agricultural production - industrial food processing in the case of the agricultural machine industry. It is not necessarily an exaggeration to state that if several traditional branches co-

operate constructively, they may coordinate their activities in such a way that a qualitatively different and up-to-date chain might emerge.

4. In the definition of the traditional branches, it was the traditional nature of the technological processes which was being referred to. At the same time, it was emphasized that such a definition does not exclude the simultaneous adoption of advanced technologies and equipment. International experiences show that automation, the application of electronics and the adoption of other advanced techniques have tended to increase primarily in the preparatory, secondary and auxiliary processes (designing, packing, quality control, storing, etc.). The related Hungarian experiences show just the reverse tendency. While the up-to-dateness and technological level and supply of the most important means of production of the traditional branches may be qualified as comparatively good (except, for example, a certain group of brick factories), in other fields of their activities they lag behind their competitors - and this tendency has increased in recent years. The reasons are, of course, well-known (scarcity of resources, import restriction) but the serious possible side-effects of this tendency are perhaps not so well understood.

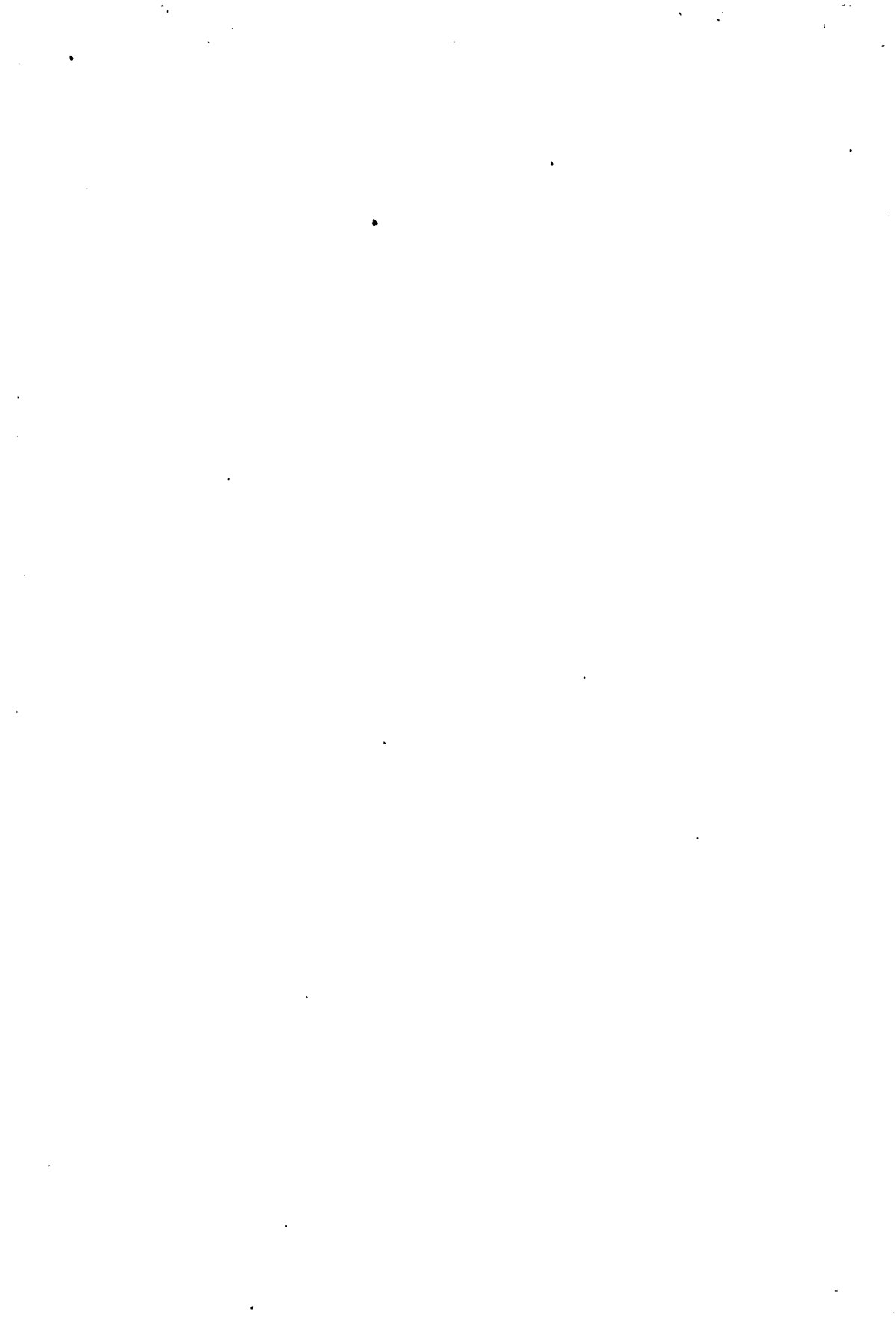
5. The unsettled state of the mechanism of rationalization is conspicuous in the field of the traditional branches. In these fields a structural change cannot be conceived without the rationalization of the non-profitable, non-competitive activities. In addition to the known questions, our analyses also demonstrated the particularly unclear and unsettled principles and methods associated with rationalization in such field where central intervention cannot be expected, but where much more is needed than isolated company-level measures. Even now, practically no organization or authority takes the responsibility for the branch (sub-branch)-level economic rehabilitation programmes. Maybe the Hungarian Chamber of Commerce is suitable for this task, but its sectional system covers units which are far too large. Therefore, it seems that it is necessary to consider the establishment of such organizations which are suitable for representing, safeguarding and harmonizing the branch interests. Such corporate organizations already exist in several countries (e.g. in the form of the so-called 'Fachverband').

6. Finally, mention should be made of the fact that the traditional branches do not make enough use of the old skills. In certain trades - mainly in those where they could provide a 'plus' which could contribute to competitiveness - the old master-craftsmen have disappeared and there has been no fresh supply. The example of the wool industry shows that certain kinds of products - which have already been 'written off' (e.g. carded cloth) - might find new market opportunities. However, in order to change this situation well-trained experts are needed.

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SHAPING THE PRODUCT STRUCTURE IN HUNGARIAN INDUSTRIAL COMPANIES

GÁBOR PAPANÉK

In recent decades, several official documents and studies published in the special literature have analysed the structural crisis of Hungarian industry; in doing so, they have looked for the causes of the crisis and for possible solutions. Although a number of recommendations by experts have been put into practice, these efforts have failed even to prevent the increase of the country's troubles. It is on this account that the present paper ventures to find an approach - in a wider context than usual - to the possibilities of taking a step forward.

The Aim of This Analysis

In the industrial field the word 'structure' serves as a comprehensive denomination of certain characteristic proportions (division, composition). What actual divisions or compositions are to mean depends on the given topic, on the very nature of the on-going investigation and on the consideration wished to be emphasized by them.

At the same time, it is well-known that structural troubles have been a concomitant of the development of our industry for more than a century. At the initial stage of the industrialization process Hungary had also to face such problems as the lack of whole branches of industry and the backward state of existing branches, i.e. the deficiencies of the economic macro-structure. Due to earlier efforts, by the seventies, the branch-specific structure of Hungarian industry had become somewhat similar to that of the highly industrialized countries. Despite this advance, however, several difficulties have arisen within the 'micro-structure' - namely, in the product structure of industrial companies. Furthermore, the growing proportions of obsolete and incompetent products, produced at a low rate of efficiency, have by now become the central problem of the economy.¹

The crucial problems of the country's micro-structure and their major implications - the low efficiency of the economy with its almost zero-rate growth and a catastrophic deterioration of the terms of trade - are now widely known. All the same, no general agreement has been reached within industry as to the possibilities and the related tasks for getting out of this situation. It is on account of this that the present paper seeks to find an answer to this question. Our funda-

1 For more details see: [1, 2, 3, 4].

mental consideration is that the efforts made so far to improve the industrial structure have failed to yield the desired results, mainly because they constitute no more than symptomatic treatment. The previous efforts had been generally aimed at introducing (or significantly expanding) the gross output of products qualified as 'favourable', and simultaneously stopping the production of goods seen as 'unfavourable'. The practical method of structural adjustment, however, does not lie in a voluntarist and campaign-like selection from among these possible products, but in a *continuous development activity*. This should take into account all the characteristics of the structural changes and should extend to every important field of the economy. This is all the more so since - in addition to the conscious interventions of decision-makers - changes in the industrial structure are also shaped by 'external', 'spontaneous' effects. It is under this double influence that the characteristics of the structure are permanently altering. A clear picture of these changes or alterations may be given by means of the so-called 'product cycle curves'. These curves demonstrate periods of development, of introduction to the market, of expansion saturation, and decline. They also call attention to the fact that in the mentioned periods, the marketing possibilities, the required production and selling costs, and the price of a given product will be modified with these characteristic tendencies. Consequently, what can be considered as the very essence of structural change is the continuous influence exerted on processes effecting the product cycle curves (i.e. which promote desirable changes and impede the unfavourable ones).

In the sense outlined above, the introduction of 'favourable' products into production is only the first step necessary for structural change. A further task - which is absolutely indispensable - is the expansion of production and the marketing of products judged as 'favourable'. The anticipation of results always requires the consequent (market) struggles of the phase of maturation too: this is because, by the time of the decline, the returns on the investments of all the previous phases must have been achieved. Nowadays it is a common understanding among economic experts that most of the tasks of structural development, as mentioned here, are company responsibilities. Namely, both the related official standpoint in Hungary [5, 6] and the international economic literature, claim that the most important factor for achieving success in structural development is the resolute and strenuous effort of the working collectives undertaking the necessary task. Success also depends on the large number of minor and major measures taken to enable companies to adjust, continuously, their research and development, and their production and marketing activities; they must also assess the actual market demands as well as other possibilities.

Experience shows, however, that the country's industrial practice has not adopted the above-mentioned methods effectively enough to perform the mentioned tasks. Therefore, the following analyses concentrate on questions concerning methods. Before going into details, we are going to summarize the possibilities of applying some techniques of major importance in the following table. Then, proceeding along the individual phases of the product cycle curve, we try to find out the following: (1) in what ways and by what means do the industrial companies attempt to face emerging structural problems?; (2) what kind of results might these applications yield and what type of problems might they pose?; (3) what other techniques could be applied practicably?

Our actual investigations are based on information concerning 50 of the well-known actions, of Hungarian industrial companies, aimed at transforming their structure. Our 'sample' comprises cases, in equal proportions, from the heavy and light industries and from small and large companies. Although their selection was not exactly a random one, they seem to offer, by and large, a correct picture of the individual characteristics of structural efforts. In the individual cases, the actual examples cited by name were quoted in the press.

Methods and functions of structural change

Methods	The scope of applications in the phase of				Function of applications in improving the			
	development, introduction	expansion	saturation	decline	up-to- dateness	quality	efficiency	market- ability
Introduction of new products	+				+		o	o
Standardization, spe- cialization		+	o			+	+	
Highly detailed preparations for financing development activities	o	+					+	
Marketing	+	+	+	+			o	+
Psychological and other methods of work organization		o	+			+	+	
Calculations of production costs	o	o	+	o			+	
Value analysis	o		+			o	+	o
Disinvestment				+	o		+	

Legend: + main scope of effect
o significant 'side' effect

Development of New Products

According to experience, at the beginning of the product cycle of each product, industrial companies tend to set objectives related to *technological development*. The product development based on the companies' own research and development activity is outstandingly successful and may primarily be found in those industrial sectors (e.g. in pharmaceutical companies and in certain fields of electronics) where there are only a few difficulties in paying the patent fees. Beside the success of own research, that of *purchasing licences* is also a frequent occurrence. Good examples of this are the *Hajdú* washing-machines, the *Lehel* refrigerators, and even the Hungarian *Levi's* blue jeans or *Adidas* shoes.² Other companies have also scored remarkable successes in introducing products which have now become traditional (e.g. by joining in the existing system of the industrial division of labour on the basis of cooperation).

In the course of the investigations it was found that the structural problems of companies arose, *in one out of every five cases*, in the above-mentioned fields of development activities. New products seem to pose more than the average number of problems in the machine industry. It is a specific feature of Hungarian industry, however, that in most cases the manifest defects do not originate from the advanced technological development of our competitors that we are unable to follow. This means that the failures are not the direct result of our lagging behind in the technological race. There are two known ways of explaining the unfavourable phenomena: on the one hand, the country's research and development activities are not market-oriented; on the other, and this is even more frequently felt, the available 'product ideas' or brain-waves are not smoothly utilized (adapted) by the companies. As a result of all this, several 'new' products have become obsolete at the very moment of their birth. The rate of change in the product pattern is very low. The companies do not adjust themselves flexibly enough to the consumers' demands nor do they respond quickly to the changes of fashion. Similarly to the causes of the failures, two main spheres of the typical problems may be outlined. One is exemplified by those companies which - despite the shortage phenomena of the economy - are unable to find a product pattern which promises favourable perspectives to them.³ Owing to the given problems, several factories have, over the past few years, undertaken to produce traditional machine components, spare parts and part-units which are considered as shortage goods. With such activities, however, most of them could not make an adequate profit (i.e. they could not harmonize prices with production costs). As an example of this, the case of the one-time Red Star Tractor Factory can be quoted - the complete liquidation of this factory could not be avoided, even after its merger with the well-managed RÁBA Works. The other sphere of typical problems is represented by those new and really competitive products which industry was capable of manufacturing but which the factories were unable to produce (in a feasible volume) in due course.⁴

Beyond all this, an additional problem of the development phase (which was

2 In the case of good examples it is deemed superfluous to give the sources of information as meticulously as will be done in the case of failures.

3 For example with its century-old traditions, the Hungarian Ganz Danubius Ship and Crane Works is seeking after a new product pattern. (See: [7])

4 An internationally-known example of this is Rubik's cube, the production of which made profit only for the foreign manufacturers. (See: [8]) Another 'case' in point is the new underground railway ('Metro') train produced by the Ganz-Mávag Works; the construction of this was judged by user companies as good, but the raising of funds for turning out sufficient samples has long caused serious problems. (See: [9])

frequently reported in our investigations, both as regards individual 'cases' and the whole of an industry) lies in the illegal manipulations and corruption connected with the fees of inventions and patents.⁵

As regards the methods to be recommended to industry for enabling a wider application, we should first call attention to the marketing techniques which help to develop new products and also help to introduce those products on the market. We think the failures in the first phase of the product cycle curve could possibly be evaded if the companies - when selecting the items to be produced - would aim at identifying and meeting the 'consumers' demands. Until recently in structural development it has been a frequent practice for decision-makers to try to live up to the expectations of higher authorities. However, several 'cases' in our investigation clearly indicate the long-range dangers hidden in this - essentially short-term - strategy.

We will not enlarge upon any purely technical-type methods of product development, since they are all widely known.

Instead, we once again point out the above-mentioned problems of 'interestedness', however obvious they seem to be; we also note the fact that the irreplaceable factors of success in research and development are the creativity of manpower and a company attitude which encourages, recognizes and rewards creativity.

Tasks in the Phase of Expansion

In the expansion phase of the product cycle curve - i.e. in the period of extension of both production and marketing - industrial companies seek primarily to meet the increasing demands on resources, and to obtain the necessary materials, energy, machinery, manpower and capital. To achieve their objectives, they adopt a variety of well-known methods and procedures, which are differentiated according to the types of resources (thus, for instance, they conclude delivery contracts, recruit workers, take up credits, and so forth).

During our investigations it became apparent that structural problems are most frequent - *in one out of every two 'cases'* - in connection with the above-mentioned tasks. One group of these problems, the shortage of resources, is widely known. The pieces of information we received frequently revealed the lack of capital and the difficulties in *financing* the investments necessary for expanding production. The best example we know is the Charcoal Production Company's problem of developing powder metallurgy. There, the lack of money meant that for a decade they could only meet a fraction of the demand for their products. [12] However, the experiences gained unambiguously show that the most serious recent troubles are in fact connected with the rational utilization of available resources, and with the implementation of investments - rather than with the scarcity of resources. Serious omissions have often been committed in performing marketing tasks in the period of market growth. After the product development phase industry seems largely unable to realize up-to-date mass-production on a wide scale and at an adequate quality level. Thus investments are often not recovered, or are recovered only after an unduly long time. Huge investments frequently turn out to be a failure; thus in the new coal mines at Mány, the production had to be stopped due to *water intrusion* [13]. The dyeing conveyor at the Salgótarjáni Tűzhelygyár (Kitchen Stove Factory of Salgótarján) is another example of such cases - although it had been installed it had been out of order for years. [14] Yet another example is the chip plant of the Mikroelektronikai Vállalat (Microelectronics Company),

⁵ See articles in the dailies: [10, 11].

which burned down shortly after the start of production. Wasteful investments creating overcapacities are also frequent occurrences. To be classed in this group of problems there are several investments in the metallurgy industry in the late seventies. These were made at a time of world-wide crisis in this branch: thus the so-called 'converter' steel works, shortly after their installation, worked at a very low-rate of exploitation, and the Siemens-Martin Furnaces at Ózd which had recently been renewed, had to be dismantled. ([15, 16, 17, 18]) Similarly, investments in the Ganz-Mávag Works, in the Cable Works and in the Porcelain Factory at Hollóháza were followed by serious marketing difficulties. The Halasi Kötöttáru-gyár (Halas Knitwear Factory) with its extremely expensive constructions, its incompetent management, and its absolutely inferior-quality products was even commemorated in a literary work. [19]

Some further problems concerning the expansion of production and the related marketing processes, along with their solutions, are maybe less known or widespread than the former. We have found, for instance, that there are unjustifiable differences - throughout the industrial field - associated with the final construction of products suitable for mass-production. Thus, several industrial branches manufacture products and components which, due to the unit design and the application of small-scale industry methods, are produced at a very low rate of efficiency. However, these same products are manufactured on a very large scale and with specialized technologies in the advanced industrialized countries. Such practicable 'methods' are well-known here but they have not been introduced. The production of *interchangeable product-components* now have traditions dating back two centuries in this country. During the inter-war period in Hungary, the number of non-standard elements that could be built into products was maximized. In the fifties, the so-called 'Mitrofanov-method' of working out technology types was widespread. However, it is beyond doubt that all these methods increased the necessity of co-operation in production - yet in Hungarian industry there are often troubles and defects related to the process of cooperation. In most cases it is difficult to find those who will undertake the delivery of the necessary basic materials, spare parts, components, etc. Cooperation is often accompanied by debates concerning prices and deadlines; also, there are frequent disagreements about the quality of products manufactured as a result of a cooperative venture. Often, contracts contain 'loopholes' from the outset, and the violation of a contract is regarded as a forgivable offence. Detailed case-studies have already been published on similar problems at the IKARUS Company and the Szerszámgépipari Művek (Tool Engineering Works). ([20, 21]) However, some other Hungarian examples, such as IKARUS buses or the furniture industry prove that within the country's industry it is possible to create conditions for the successful adoption of the mentioned techniques. Moreover, it also seems probable that the deepening of specialization in production as well as cooperation between companies might give rise to effects which go beyond the decrease of direct costs. Namely, it might lessen the 'autarchy' of companies, and it can be taken for granted that it would also slacken the demand which production expansion makes on resources (i.e. primarily on capital).

It is to be noted here that in the mid-seventies, within the financing of investments, the big centrally-funded investments (which did not involve compensation were of considerable importance. Over the past decade, however, bank-credits have played an increasingly important role in raising funds for investments (since this form of allocating funds provides a better guarantee to the top leaders of the economy that the investments will be recovered). Nevertheless, the present system of capital allocation still seems to be one-sided although, recently, companies (economic organizations) have also been permitted to raise their funds by issuing *stocks and bonds*. However, these 'new' ways of raising funds - which constitute the most common form in the advanced industrialized countries - were negligible in the cases involved in our investigation.

Finally, among the methods recommended on a broad scale and especially in the case of the phase of expansion, the *marketing techniques* deserve a special attention. As is widely known, these methods are most useful to companies who wish to expand their marketing activities. From these methods, the majority of Hungarian industrial companies are now adopting the market research method (although even this single method is narrowed down). In our experiences, it is becoming a more and more common practice for industrial companies to build up a comprehensive system of marketing. Thus they tend to create their own sales network in the country, they obtain the foreign trade right and several companies - e.g. TUNGSRAM - have developed a marketing chain that covers the whole world. On the other hand, the working out of independent price-policies usually meets with difficulties, and so do the intensity and efficiency of advertising activities. Certain market effects, which are directly connected with products, pose even more problems. Most companies could improve their market positions, both at home and abroad, if they first of all raised the quality-level of their products, if they kept delivery deadlines, and if they promoted the quality of joint services.

Tasks Associated with the Phase of 'Maturity'

In the phase of 'maturity' or 'saturation', the main task is to maintain the competitiveness of products. Several methods have been elaborated throughout the world for this purpose.

The problems involved in this phase have so far not been given much attention by the (Hungarian) economic literature. Our investigation, however, indicated that problems associated with this phase of structural development were evident in one out of every four or five cases examined. Recently, for instance, certain companies in the metallurgy and in the textile industry have not been able to keep their (export) market positions. Metallurgical products were sold at prices lower than those for iron scrap. [22] In the late seventies, many complaints about quality were lodged with companies exporting the products of the garment and footwear industries. Not only that, but (Far Eastern) competition has frequently ousted our products from other traditional markets. For years Hungary has not been able to reach profitability in exporting bicycles and has been unable to create the production background for the export of good quality stoves. [23] Sometimes the People's Central Commission of Control has registered even more alarming situations within the domestic market: e.g. in the building material industry and in the furniture industry. Undoubtedly, Hungarian industrial (economic) organizations have tried - from the outset and to an unduly high degree - to produce mass-products of 'medium'-quality - these are, more than any other products, exposed to the competition of developing countries. Adding to the mentioned problems associated with products are those problems involving packing-techniques, delivery terms, services, and the deficiencies of advertising. Our marketing activities have not even been able to cope with the competition coming from countries which have only recently embarked on the road of industrialization.

In order to eliminate these problems, it seems that a more extensive use of up-to-date methods of work organization are regarded as being of high importance. Although we received information from several companies (among others, from textile industrial firms) about their recourse to well-known (foreign) organizing institutes, their preparation of precise movement-studies, their adoption of ergonomics, their introduction of sophisticated methods of stimulation, and the attempts of certain large companies to make their plants independent, it seems that none of these efforts go beyond the Taylorian principles of work organization. It

could be established for a good number of the cases examined that improving the competitiveness would require - in addition to 'economic engineering' activities - that equal attention be given to 'human factors', especially with regard to the improvement of the quality of work. Our examples provide only sparse information on the application of processes concerning the *psychology and sociology of labour*. Progress made in the selection of managers, in job enrichment and job enlargement and in forming autonomous teams has to be qualified slow. Although, since 1984, the directors of many companies have been elected by the company council, the overwhelming majority of the elections so far organized were merely formal - inasmuch as the former leaders were re-elected. An innovation of the eighties concerning Hungarian work organization, the enterprise business work partnership (VGMK) has not, in general, enhanced the workers' zeal for work. Instead, it has promoted an evasion of the artificial wage constraints within a narrow circle of workers that often gives rise to unfavourable side-effects too.

Likewise, the adoption of the methods for *reducing the production costs*, in order to strengthen the competitiveness of industry, represent a crucial issue. Companies are bound to prepare re-calculations (*ex-post-costing*) according to the kind of product or group of products, they often compile pre-calculations broken down in a similar way and they regularly launch campaigns for cost reduction. Nevertheless, in the case of several companies in our sample it was established (once more) that exact and comprehensive data on the real expenditures on products are not available. Moreover, only in a few cases was their evidence of collectives or persons interested in eliminating the deficiencies - e.g. in the pharmaceutical industry (in which patent fees are paid), or among experts of certain small industrial firms or groups that are funded according to their results. Anyway it is unnecessary to mention any calculation techniques since they are so commonly known. Thus it is enough to make reference to the most effective method for analysing the production costs of individual products: this is the *value-analysis* method which had been adopted by several of the companies under investigation, e.g. by the TAURUS tyre company.

Rationalization and Retreat from the Market

Rationalization,⁶ the last phase of the produce cycle curve, is commonly known as the weak point of industry in Hungary. Companies have often failed to stop the production of obsolete, non-profitable goods. In spite of this, in one out of every ten of our 'cases' certain failures related to rationalization caused problems. Recently, a storm of indignation was caused by the closing down of a small brick factory just at a time when the shortage of bricks was at its peak; also, some detected large-scale thefts and corrupt practices made the liquidation of a large building company 'more vivid'.

At the same time, the adequate techniques of rationalization in industry are - unfortunately - only just taking shape. Our investigation also found some examples of the successful change of product pattern and diversification in the machine industry. In the textile industry (e.g. at the Budaprint Co., or at the Magyar Selyemipari Művek /Hungarian Silk Works/) and at the Medicor Co., the sale of certain plants represented the solution to the lack of demand and the problems of efficien-

6 The term 'rationalization' refers to reductions of certain capacities in order to improve overall performance. (Editor's note.)

cy. However, it is clear that the number of such examples is small as compared with that of the obsolete products, and rationalization in most companies has not yet become a necessary and integral part of structural transformation efforts.

Conclusion

This paper has so far analysed the structural problems of industry and the related tasks at the company level. Within this, however, it should be pointed out that the causes of the problems presented here are found mainly in the *macro-sphere*. It is a generally held, and many times verified, view that the 'paternalistic' nature of the country's economic management (i.e. regulation according to the orientation of power) [24] strongly prevents the micro-sphere from carrying out the necessary and vital structural adjustments.

At the moment, it is customary for most criticism to blame the weaknesses of the regulation system. This has brought about a consensus to the effect that the country's redistributive mechanisms (price-, tax- and subsidy mechanisms) directly hinder our advancement in the structural field. Namely, these mechanisms tend to equalize the financial positions of companies: the decisive share of profits made by the successful companies through the redistributive channels is spent on subsidizing the companies in red. This deprives promising lines of production of necessary resources. However, several other elements of this system of economic management also help to conserve the old structure. Changes are often impeded by central expectations. During our investigations we came across several - centrally determined - product pattern changes in which the domestic version of a 'new' product (otherwise produced highly competitively elsewhere) could not surpass the changed one either as regards the parameters or its marketability. An increasing number of problems have arisen over the past decades due to the centrally-created monopolistic position of a wide range of industrial companies. Quite a number of examples may be cited which demonstrate the deliberate moderation of the monopolistic supply,⁷ the effects of monopolistic prices and the related slow-down of technological development. The lack of co-ordination in the planning activities of companies and in leading authorities, the unclear manner of harmonizing interests, the constantly re-appearing spectre of interests related to the performance in the previous year and many others also add to the existing problems. To remedy the above-enumerated and similar deficiencies, experts have often suggested the need to modify precisely these criticized elements of economic management in one way or another. Several of these suggestions have even been realized. These partial measures, however, have not produced the desired effect, and in fact it did not take long for them to become built into the system of paternalism. Therefore, it has now become a generally accepted view - even an official standpoint - that the structural problems will only be eliminated once and for all after the implementation of a political reform aimed at preventing the constant recurrence of paternalism. [27, 28] It is only with the unification of regulation, with the extension of the scope of authority and, in this respect, with the controlling tasks of the Parliament that group-interests can be prevented from being built into the regulation system (e.g. through hiatuses in law, through the formulation of 'application instructions' which contradict the law, or through practices which are different from those generally prescribed and accepted, etc.).

⁷ For metallurgy see: [25], for the dairy industry: [26].

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PRODUCTIVITY AND PERFORMANCE IN THE HUNGARIAN ECONOMY*

ZOLTÁN ROMÁN

The postwar 'golden age' of the world economy came to an end in 1973. In Hungary the definite slowdown of economic and productivity growth occurred with a five years' lag; this is reviewed in *Part 1*. *Part 2* enquires into the reasons of slackening and depletion. Beside the disappearance of previously favourable factors and the impact of unfavourable external changes, the author finds the main causes in the procrastinations relating to adjustments of economic policy and in the inconsistencies of economic control and management (i.e. in the implementation of the reform). In this connection, *Part 3* analyses the role of productivity and performance in the system of goals of Hungarian economic policy and of Hungarian enterprises. The Hungarian economy is now searching for ways of stabilization and for ways of extricating itself from the difficulties. The productivity and performance conditions of this are discussed in *Part 4*.

1. Fast Growth, Slowdown and Depletion in the Hungarian Economy

The national income of the Hungarian economy recovered its prewar value as early as 1948, whereafter it increased at a high rate (by an average of 5 per cent per annum, see *Fig. 1*). Growth was mainly fed by the rapid expansion of industrial production (an annual average of 7 per cent). The national income generated by agriculture showed little increase, but the growing gross output of this sector contributed substantially to domestic supply and exports.

Fig. 1 shows the striking fluctuations in the early 1950s, the impact of 1956, and the subsequent straight line of growth until 1978. Despite acute tensions, such as investment cycles and deficits in the balance of trade, the standard of living has considerably improved since the mid-fifties.

Due to its small size, the Hungarian economy is strongly dependent on the international division of labour. Recognizing this fact, the Hungarian economic lead-

* Reprinted from the Proceedings of the European Association of National Productivity Centres conference: "Managing for Productivity. A View Around the World", held in Budapest, September 1987. Table 1 and Figures 2 and 3 have been completed with the data from 1987, and in Part 5 a few concluding remarks have been added to the original paper.

ership ended previous autarchic approaches and began, from the middle of the 1950s, to pursue integration with the international division of labour. The share of foreign trade is rather high even by comparison with other small countries: about 40 per cent of GDP, with a quarter of total industrial output being exported. The share of the turnover with market economies has been gradually rising and is now in the range of 50 per cent. Knowledge of advanced technology, as well as specialization and the utilization of economies of scale were promoted by broadening international relations. At the same time, however, the country became more sensitive to foreign trade and to changes in the world economy.

The shortcomings of the Hungarian economy in quality, productivity and competitiveness became more apparent and pressing from the mid-sixties onwards, with the intensification of the relations with advanced countries. It was realized from such signals and from a critical analysis of the functioning of the economy that the system of economic control and management needed more than slight amendments: profound reforms had to be made.

The reform was introduced smoothly in 1968 and the economic results of the following years were favourable. Enterprise initiative became more daring, market supply improved, and the relatively high growth rates were maintained. A comparison between the two periods before and after the reform showed that labour productivity indices increased at faster rates while those of total factor productivity were about the same (see Fig. 2). However, when the new system began to differentiate between successful and failing companies, the more or less latent opposition to the reform was activated. Also international events did not favour the continuation of the reform. Furthermore, it had to be recognized that the new system needed considerably more improvement with respect to its design, individual components and functioning than had been expected. However, the next steps in implementing the reform (those being contemplated concerned organizational and institutional changes as measures towards stronger competition) and those warranted by the initial experiences of the reform did not take place: centralization was strengthened and enterprise autonomy was once again restricted.

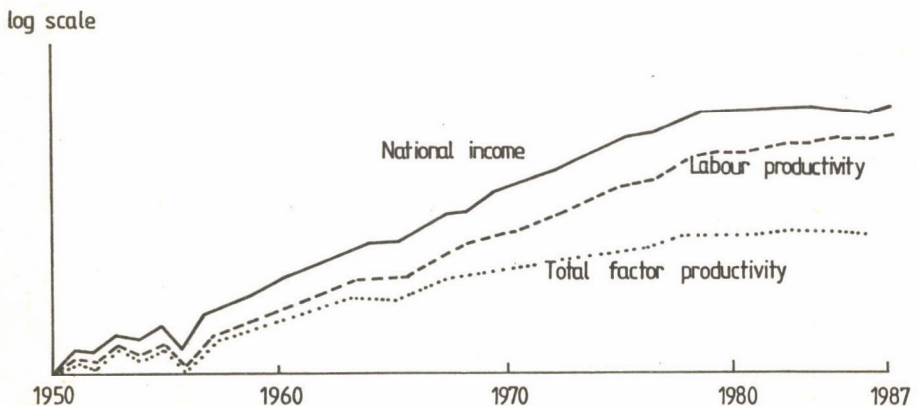


Fig. 1 Growth of national income and productivity, 1950-1987

This was also motivated by the fact that from the early 1970s the Hungarian economy was seriously affected by the changes in the world economy. Nevertheless, these changes were judged as being transitory by the economic leadership, which assumed that their consequences could be countered by appropriate administrative measures and by occasional interventions. This assumption was mistaken. The substantial losses inflicted upon the Hungarian terms of trade by the rising prices of energy and raw materials could not be balanced by better performance and structural adjustment. The economic leadership nevertheless kept encouraging growth and investments and the standard of living kept growing - albeit at the expense of external resources.

The deficit of the balance of trade (especially in convertible currencies) became entrenched and exceeded 10 per cent of national income in 1978. Availing itself of the access to Western bank credits and encouraged by the low nominal interest rates (then 5-6 per cent, but doubling very rapidly thereafter), the country increased its (net) debt in convertible currency to about 8 billion dollars.¹

In 1978, a decision was taken to decelerate growth. Economic policy focused on bringing about an equilibrium in the balance of trade. The original reform concept of economic control and management was reaffirmed and further measures towards its implementation were taken by the political leadership. Some of these measures were taken in 1980 while preparation for the others was left to coming years.

The second oil price explosion was followed by a depression in the market economies; protectionism increased, there was a worsening of the political climate and the money markets became tougher. Thus the Hungarian economy had to face serious liquidity problems. Maintaining its international liquidity and improving the balance of foreign trade became the first priority of economic policy, pushing other objectives to the background. In this way, along with a yearly growth rate of 1-2 per cent and with full employment being maintained, the level of personal consumption was preserved, though not for every group of the population. Inflation reached an annual rate of 7-8 per cent, real wages declined and investments had to be severely curbed. The increase of labour productivity continued but slackened, and total factor productivity showed stagnation.

The new economy policy line steadily trimmed the deficit of the balance of trade from the end of 1978 and then, from 1982, turned in into a surplus (see *Table 1*). It managed to reduce the debt in convertible currencies to 6 billion dollars. On these grounds the economic leadership assumed that reinvigoration of economic growth could come to the fore. Curbs on incomes and investments were eased, and a new programme was started in order to carry on with the reform of economic control and management.

The surplus necessary for servicing the debt and for debt repayments increased only until 1984; in 1985 it decreased and in 1986 it turned into a substantial deficit - 1987 is unlikely to produce better results. The stock of (net) debts in convertible currencies rose above 9 billion dollars. Thus the earlier (and contested) ideas about accelerating growth had to be abandoned.

The present situation of the Hungarian economy is considered to be difficult in the extreme. The shift in economic policy after 1978 contributed, for a number of years, to the improvement of external economic equilibrium and preserved the international liquidity of the country even in severe conditions. However, the severe restrictions on imports and the insistence on exports thwarted the updating of the structure of production. We could not keep abreast with global technical progress - the gap even widened. Too many of the resources of successful companies were

¹ Lacking exact data, at this and other places, only estimates of the orders of magnitude and of the changes can be given. The available sources publish strongly divergent data owing to rather different methodological approaches.

Table 1

Major indicators of the Hungarian economy, 1978-1987

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
	Percentage annual changes									
National income	4.0	1.2	-0.9	2.5	2.6	0.3	2.5	-1.4	0.9	3.2
Labour productivity	4.5	1.4	-0.1	3.3	3.0	0.8	3.2	0.8	1.5	3.6
Total factor productivity	2.3	-0.9	-2.3	1.2	1.3	0.4	0.8	-1.3	-0.5	3.0
Domestic use of national income	9.2	-5.8	-1.7	0.7	-1.1	-2.7	-0.6	-0.7	3.9	2.1
Volume of investments	4.9	1.0	-5.8	-5.2	-2.2	-3.0	-2.9	-2.3	2.3	6.9
Real income per capita	2.9	-0.1	0.4	2.9	0.9	1.1	1.1	1.9	2.3	0.1
Real wages	3.1	-1.7	-1.6	1.1	-0.7	-3.2	-2.4	1.3	1.9	-0.6
Consumer prices	4.6	8.9	9.1	4.6	6.9	7.3	8.3	7.0	5.3	8.6
Volume of exports	1.5	12.5	0.9	2.6	7.2	9.5	5.8	-0.3	-2.2	3.8
Volume of imports	12.6	-3.3	-1.2	0.2	0	4.0	0.1	1.1	2.1	3.3
Changes in terms-of-trade										
- total	-0.6	-1.8	0.4	-0.8	-2.2	-2.6	-2.2	-1.0	-3.6	1.3
- in convertible currencies	0.8	-1.2	1.6	2.2	-1.1	-2.4	-2.4	-1.1	-7.1	0.0
	Billion forints									
Balance of foreign trade										
- total	-59.8	-25.0	-18.2	-12.9	1.4	13.2	28.9	19.4	-18.3	-13.5
- in convertible currencies	-42.8	-10.3	-0.9	1.1	19.7	27.8	35.2	12.1	-18.3	-16.8

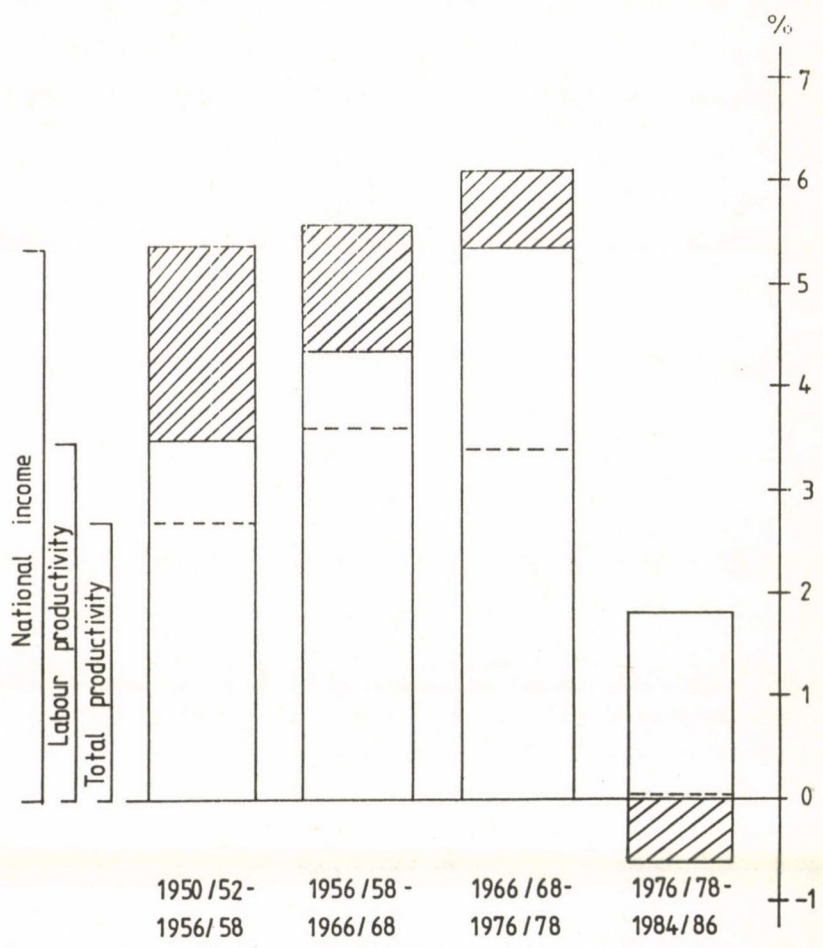


Fig. 2 Growth of national income and productivity in the four subperiods of 1950-1986

taxed away to subsidize loss-making activities. The broader opportunities given to the secondary economy resulted in additional performance, but in many cases weakened the work ethic and motivation in the primary economy (i.e. in full time jobs).² The systemic function of economic control and management - as well as enterprises intentions - were marred by frequent individual interventions. These were thought to be inevitable in cases of hardship.

Unfavourable external economic impacts significantly contributed to the difficulties of the Hungarian economy; however, we do not intent to find the roots of the problems there. The resolution taken by the Central Committee of the Hungarian Socialist Workers' Party in November 1986 stated the following: "National economic planning, regulation and the institutional system has not ensured a satisfactory improvement of the external and internal conditions of equilibrium, nor the exploration of new resources required for activating the economy. National economic and enterprise interests are not adequately harmonized. Decisions have been taken belatedly on major problems of export and import management, and on the prevention and resolution of market difficulties. The targeted development of the system of economic control and management has not been implemented consistently."

Agriculture has lost much of its former capacity as a successful source of convertible currency, and is in need of restructuring and modernization. Compensating for deferred developments would require investing enormous resources in several infrastructural sectors. The dynamism of industry has been depleted and its competitiveness in those markets which demand high standards is unsatisfactory. Product quality is often poor and the low level of productivity implies extra inputs of production (in materials, energy, fixed assets and working time) which the market neither accepts nor remunerates. The pattern of production and exports show the delay in structural adjustment, with the marketable commodities that represent advanced technology having a low share. Industry, and the economy as a whole, faces a dual challenge: to substantially improve quality and productivity, and to update the pattern of production. As far as we see it today, this requires simultaneous changes in enterprise work practices, in economic control and management, in economic policy and in the political and institutional system. After some delay, a complex programme was drafted in mid-1987 for this purpose.

2. Accounting for the Slowdown and Exhaustion of Growth

Herman Kahn [1] distinguishes four stages in the 20th century growth of the advanced market economies, with growth rates as follows:

La belle Epoque	(1886-1913): 3.3 per cent
La Mauvaise Epoque	(1913-1947): 1.8 per cent
La Deuxième Belle Epoque	(1948-1973): 4.9 per cent
L'Epoque de Malaise	(1973-2000): 3.5 per cent

2 The legal activities aimed at providing additional income - mostly in addition to a full-time job - are referred to as the 'secondary economy' in Hungary. Its share in total labour inputs is approximately one third. According to a recent survey of the Central Statistical Office, the share of secondary incomes in the total net income of the employees in the socialist sector of the economy increased from 28 per cent in 1977 to 37 per cent in 1986. (*Időmérleg, 1977 és 1986 tavaszra /Time budgets in 1977 and Spring 1986/, Budapest, 1987, p. 9.*)

Although Hungary's development could be divided into periods in various ways, these four stages can also be recognized in the Hungarian economy.

Economic growth decelerated in the 1970s in nearly every country. At the turn of decade the reasons were analysed by a great number of research works and conferences. In a previous paper [2] which briefly reviewed these studies, I demonstrated that the shift in the trend line identified for the market economies from 1973, commenced in the socialist countries from 1978, i.e. with a lag of about five years. I listed the following as the major explanatory factors of this slackening (of more or less general validity but of varying weight according to the country concerned):

- lack of former positive effects (primarily the fast growth of employment and its shift from agriculture to industry);
- hesitant technical progress and structural adjustment, contributing to the lack of basic improvement, and the absence of reforms of economic control and management;
- the sluggish (slower than expected) development of cooperation and integration between member countries of the Council for Mutual Economic Assistance - CMEA;
- unfavourable changes in the world economy (especially for the 'smaller countries');³
- negative consequences of the forced growth of the previous years (e.g. the neglect of infrastructure);
- the necessary curbing of investments and the implications for demand;
- worsening geological conditions for the extraction industries and increasing transportation distances in the Soviet Union.

The deceleration of productivity growth might have been less severe if full employment had not been regarded everywhere as a steadfast requirement. In cases of lower demand and reduction of capacity utilization, adequate mobility could have released the workforce from one company to relieve labour shortages elsewhere and might thus have contributed to faster structural adjustment. Some degree of structural unemployment would, however, have been inevitable - at least temporarily.

Most of these factors were actually working before 1978; indeed, this is why productivity growth had already slackened by that time in several socialist countries. It should be recalled that changes in productivity are the outcome of several factors, and impacts of different time horizons often show significant lags. Lags can be particularly long in centrally planned, closed economies. Whereas in an open market economy growth will be halted in a fairly short time (where problems arise as regards the quality of the products, non-compliance with demand, and deficiencies in competitiveness in the world market) the closed and centralized economies can delay the impacts of these effects - even though such delays are not without consequences. As regards domestic consumption, effects can be postponed for quite long periods of time.

'Opening up' the socialist countries and intensifying their economic relations with the advanced market economies are phenomena which attack 'closed growth': its lasting maintenance is no longer possible. This is what has been clearly demonstrated, among other things, in the post-1978 deceleration of economic growth in the smaller socialist countries.

With respect to the Hungarian economy, there is the additional impact of the slowdown in the growth of productivity; also investments have been curbed even more than the gross figures suggest, because a high share of investments have in fact gone to mining and energy. This factor became an additional constraint on the opportunities for modernizing manufacturing industries.

³ With the fall of oil prices this impact has also affected the Soviet Union.

Slackening economic growth has been replaced in several countries in recent years by different degrees of revitalization. We hope that, even though it might be with some delay, the Hungarian economy will again follow suit. At present, however, the economy demonstrates the symptoms of exhaustion. Some major economic indicators for the years between 1971-1978 and 1979-1986 are given in Table 2. The demarcation indicated by the year 1978 is justified by the shift to a new economic policy orientation, although there were also significant changes within these two periods before and after 1978. (See the brief historical review in Part 1 and the data of Table 1 and Fig. 3).

Table 2

**Comparison of the major indicators of the
years 1971-78 and 1979-86**

	1971-78 (1)	1979-86 (2)	Difference (2) - (1)
	Average percentage annual changes		
National income	5.6	0.9	-4.7
Labour productivity	6.0	1.7	-4.3
Total factor productivity	3.3	-0.2	-3.5
Domestic use of national income	5.5	-1.1	-6.6
Volume of investments	6.6	-2.3	-8.9
Real income per capita	3.9	1.3	-2.6
Real wages	2.9	-0.7	-3.6
Consumer prices	3.4	7.2	3.8
Volume of exports	8.7	4.4	-4.3
Volume of imports	7.6	0.3	-7.3
Changes in terms-of-trade			
total	-2.5	-1.8	-0.7
in convertible currencies	-2.7	-1.5	-1.2
	Billion forints		
Balance of foreign trade			
total	-179.2	-11.5	-167.3
in convertible currencies	-145.1	66.4	-211.5

Comparison of the two periods indicates the following main changes:

- growth markedly decelerated;
- domestic use of GDP turned to negative;
- the volume of investment fell compared with a significant previous increase;
- the growth of real incomes diminished, real wages fell;
- inflation accelerated;
- the growth of the volume of exports was halved (4.5 per cent), and the decline of the volume of imports was even greater falling by half a per cent);
- the terms of trade continued to deteriorate, though to a smaller extent.

If as a rough indicator, the annual balances of foreign trade accounted in current forints are added up, the deficits shown are Ft 179.2 billion for the first pe-

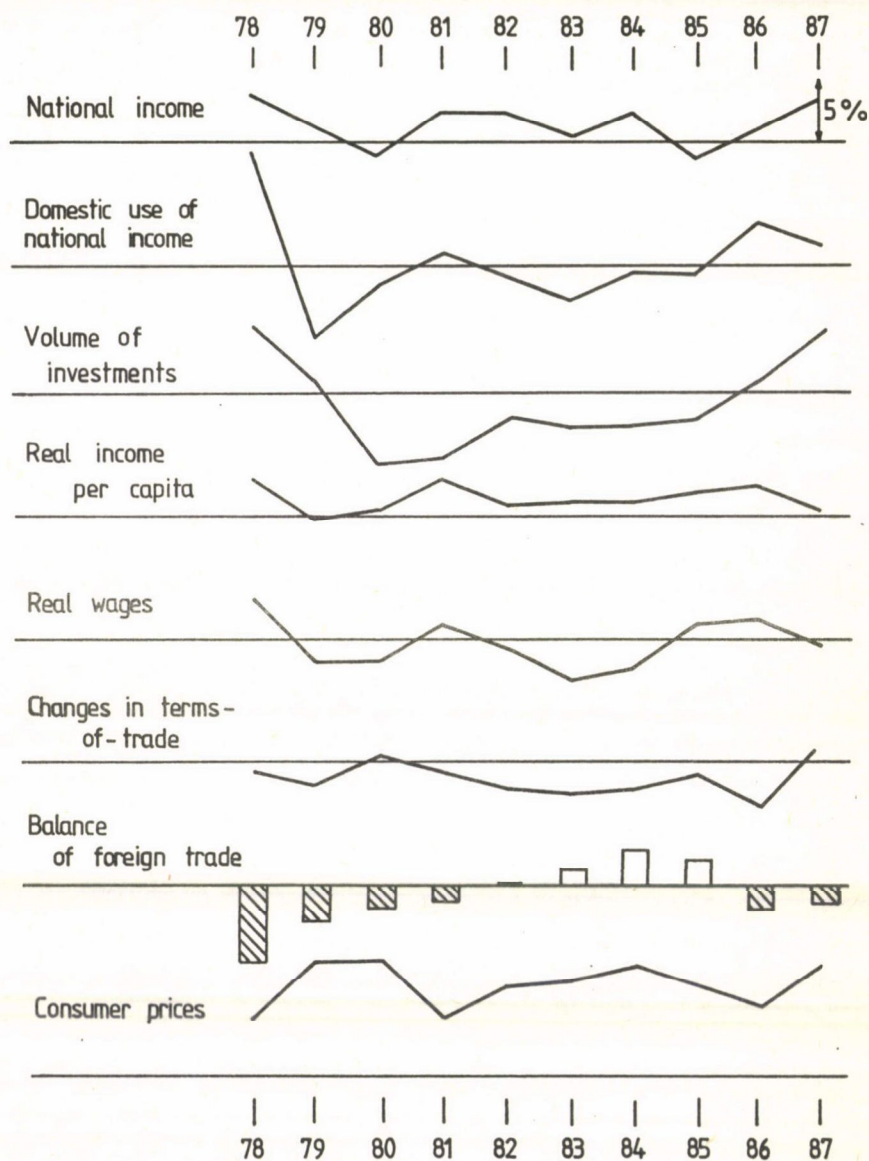


Fig. 3 The major indicators of the Hungarian economy 1978-1986
(changes compared to the previous year)

riod and merely 11.5 billion for the second (or a surplus of 66.4 billion compared with a deficit of 145.1 billion in convertible currencies). Yet, the nation's debts were greater in 1986 than in 1978. In other words, the surplus in the balance of trade could only cover the reduction of debts for a few years. The favourable balances of the intermediate years were due to changes in the rates of exchange which were to Hungary's advantage (though they have recently turned the opposite way), to sales of primary energy at favourable prices, and the Soviet purchases in convertible currency. The surplus was also due partly to the rigorous curbing of imports and the stepping-up of exports.

A period of slackening and deceleration did not turn into a period of gathering strength and dynamism; indeed, especially since 1982, in the quest for short term survival, it has ended up in exhaustion. In my opinion the main causes are as follows:

- economic policy gave priority to stability and short term objectives instead of to adjustment;
- the resources (provisionally) released by the lifting of restrictions were soon depleted;
- inconsistencies emerged in the system and practice of economic control and management;
- too many rescue subsidies and questionable investment grants were made;
- enterprise and individual motivation and confidence were weakened.

The question arises here as to whether our productivity and other statistical indicators provide a true picture of the state of the economy and its deterioration. The signs slackening (though somewhat belated) were unambiguous, those of exhaustion less so. Experience shows that the index numbers of total factor productivity reveal the problems more sharply than those of labour productivity, and two well-known methodological problems require further attention (and resolution).

Firstly, the index numbers of growth and productivity are determined according to their definitions, at constant prices; thus they do not reflect the - occasionally important and far-reaching - impacts of changing relative prices (until we shift to the prices of another base year). I am referring here in particular to the losses or gains originating from the changes in the terms of trade. For the time being, how to take account of these factors in growth and productivity accounting is still an open question. Although the Central Statistical Office does compute such corrected indices, they are not weighted in accordance with their importance in the final evaluation of the performance and state of the economy.

The worst losses in terms of trade were suffered in 1974 (7.5 per cent), 1978 (7.1 per cent), 1977 (3.4 per cent) and 1986 (3.8 per cent). The corresponding corrections would reduce the growth rates of these years by 2-3 percentage points and would reaffirm the inference that the problems reflected in the slowdown of growth date back not to 1978 but many years earlier. Such a corrected index would show a decline in GDP and labour productivity for the year 1986 rather than a slight growth.

Another significant methodological factor in measuring labour inputs using data relating to the number of active wage-earners concerns the neglect of the changes in the number of per capita working hours and of the activities performed in the secondary economy. After World War II the legal working hours per capita were considerably reduced in Hungary; on the other hand, in the secondary economy, labour inputs increased. In the long run the two changes partly compensated for one another. However, in recent years activities in the secondary economy (and also moonlighting in the shadow economy) have shown a remarkable increase.

Within the limitations given, work done in the secondary economy is recorded in statistics. Estimates are also made about the related labour inputs; however, these are judged as being too unreliable to be used to correct the 'official' index num-

bers. It is quite probable that, despite a decrease in the number of active wage-earners, the total labour input has not decreased but rather increased; this suggests that changes in labour and total factor productivity were less favourable than shown by the 'official' indicators.

Economic policy must, by necessity, pursue simultaneously several objectives. It may grant priority to some of these objectives and relegate others to the background - at least provisionally and to varying degrees. In the long run, however, it must work for the total set of these objectives. The performance of the economy should be measured by the realization of long term objectives. This is something which, in the main, cannot be quantified exactly but only approximately, though such an estimation is indispensable for correct orientation.

Again, experience warns us not to try to assess the performance of the economy on the basis of one single year and one single indicator, be it the growth of production or productivity, or the balance of foreign trade. Such a frequently misleading and overvalued role was cast, despite much criticism, first on the growth of production and subsequently on the balance at trade. A complete system of indicators and an overview of several years are needed.

3. Productivity and Performance in the System of Goals of Economic Policy and of the Enterprises

The most universal economic policy goals are usually specified as being growth, equilibrium, employment, price stability and adequate income distribution. Emphasizing three or four of them gives the 'magic triangle', 'magic quadrant' (or even 'pentagon'). Behind such objectives there are, however, more comprehensive values - above all welfare, security and freedom. Growth is a general objective inasmuch as it creates the resources for raising the standard of living, improving living conditions and enhancing the 'quality of life'. It also strengthens the productive and military potential of the country concerned.

The different objectives may, and actually do, conflict: forced growth can be detrimental from the point of view of equilibrium; efforts aimed at a higher degree of employment are likely to generate inflation, while controlling inflation may generate unemployment; in addition excessive levelling of income distribution may limit performance motivation and growth and so forth.

The main sources of growth are technical progress and higher productivity, while changes in the pattern of production are important corollaries and are frequently conditions of growth. With the progress of internationalization, both sources are indispensable for competitiveness and integration with the international division of labour. Their promotion is a cardinal *derived* objective of economic policy. In the present world a high degree of flexibility or adaptability can also be regarded as such.

Economic policy is usually exposed to the heavy pressures of short term objectives and various interest groups. Its art and finesse lie in finding the ways of concerting the aspirations of such groups from the points of view of society's general interests; it requires stating which conflicts may be tolerated - and how to tackle them - in the short run, for the sake of the long run. Planning is, or should be, a help in solving these tasks of economic policy. However, it must be remembered that planning itself is seldom immune from the pressures of short term objectives and interest groups.

Of the five objectives listed above, growth was number one in Hungarian economic policy until 1978. As was hinted in the short historical review, growth was forced even after the 1973 oil price explosion and the destabilization of the coun-

try's international balance of payments. After 1978 the balance of trade was given priority in the set of objectives of economic policy. As was shown above, economic policy was able to score spectacular achievements in this sphere until 1984 - but not afterwards.

The establishment and subsequent maintenance of full employment has been a primary objective of Hungarian economic policy for many years, even though it is accepted that its implications for productivity may sometimes be negative. The yearly increase of consumer prices was kept within a few percentage points until the mid-seventies - as seemed compatible with a socialist economy. However, such an assumption was invalidated by the events of the following years. After 1978 price rises were given (controlled) green light in the Hungarian economy; they were reined back in 1985-86, and were then let go again in 1987.

Giving top priority to living standards and to the satisfaction of the most important groups of the population has been a typical feature of the Hungarian economic policy over the past thirty years. Consumption increased after 1973, and even into the 1980s - despite the economy's considerable losses. One thing contributing to this was the fact that although the plan provided (in many cases) for restrictions, economic management could not implement them. Similarly, high priority has been given to the stability and security of enterprises and individual workers alike. In this way, low productivity and loss-making firms have again and again been granted large subsidies, although the sources for these subsidies could only be created by taxing away the incomes of successful firms. This welfare objective was one of the justifications for the liberalization of the secondary economy. The impact on the climate of public opinion was generally favourable, supply was improved and national income increased. In some of its forms, however, it provoked tensions and weakened the motivation to work in full time jobs, especially in industry.

Although the post-1973 period demanded a higher degree of adjustment and mobility of both companies and individuals, this was obstructed by the drive for stability and security. The incentives to go for higher performance remained weak due to the protected state of the enterprises.

As regards the major derived objectives of economic policy, a number of programmes were supposed to serve the promotion of technical progress. Results were unimpressive since the most potent incentive to innovation was missing: an inspiring economic environment and market competition. The inconsistent system of economic control and management could not substitute for that role.

The enhancement of efficiency (productivity) provided the main subject for several resolutions, plans and government documents. Clear cut programmes, however, were only drawn up for material and energy rationalization. These projects in fact yielded certain results (lately of diminishing magnitude). It is clearly the pressure of the economic environment that can be expected to be the prime incentive in this respect. Full employment considerations were a further impediment to increasing labour productivity. The frequently modified wage regulation system of state enterprises (in a repeated quest for better solutions) mainly encouraged enterprises to maintain and, in some cases, increase their staff. Nor was the system of economic control able to offer any effective incentive to save fixed and working assets or to increase returns on capital.

The other focus of a number of resolutions was the modernization of the pattern of production. Its implementation was thwarted, beside other limiting factors, by the drive for stability and security. As in many other countries, here too, the government allocated most of its resources to rescuing problem sectors and companies, instead of boosting promising fields that could be expected to contribute to future development. Structural adjustment was also delayed by the pressures to maintain employment, and by strong export incentives. These pressures held sway irrespec-

tive of whether they would result in the conservation of an obsolete structure or in its advancement.

All this gives the general impression - which in my opinion is not false - that in the set of declared objectives of economic policy, many were determined without due appraisal of their conflicts and feasibility, and without explicit ranking. In actual decision-taking, however, long term objectives tended to be pushed aside by urgent short run needs.

The performance of the economy and the changes in productivity are affected by governmental policy decisions and measures. Basically, however, they depend on specific business factors: companies, corporate objectives and behaviour and how far the final results of their behaviour and actions coincide with the targets of economic policy. What, then, affects corporate behaviour?

In socialist countries, the traditional system of central planning and management of the economy is based on the thesis that from the national economy plan it is possible to derive obligatory indicators for enterprises, and thus to guarantee a given rate of productivity and performance growth. We had to learn from experience that in this case three motives of enterprise behaviour need to be reckoned with. Firstly, companies, managers and workers identify themselves (to a certain and changing extent) with the societal goals and try to carry them out in their respective fields. Secondly, these persons try to aim for those plan indicators (and obligations) which they can most easily fulfil and overfulfil. Thirdly, they will search for simpler ways and means of compliance with plan indicators whenever possible - and it is always possible - irrespective of the initial macro-economic objectives.

In market economies, objectives and targets for management are set by the owner or his representative(s). These are usually stated in broad terms. The conflicting elements of motivation indicated above can also be found in this case, but there is a profound difference: the pressure of market competition enhances performance, and the scope of manoeuvre for company management, departments and staff is constrained.

Performance is evaluated primarily by profit and profitability; productivity plays a major instrumental role in increasing profitability. The main difference between the profitability and productivity indicators (keeping total factor productivity in mind) is that productivity indicators are calculated at constant prices and profit indicators at current prices. Productivity indicators measure the *quantitative* relation between input and output. Profitability indicators measure, in addition, the *relation of changes* in purchase and sales prices, thus showing the impact of quantitative and relative price input-output changes.

Hungarian companies are given no binding plan indicators. At the same time the pressures of competition and of the market are weak. The economic leadership uses various other incentives and 'expectations' as surrogates, according to the actual targets of the economic policy. The objectives of economic policy appear, in the sets of objectives for companies, to be transformed according to (1) the way the system of economic control (regulations, incentives) transmits these objectives, and (2) the degree of identification of companies with the national objectives in setting their own targets and in selecting the instruments of implementation. As soon as companies learn of the possibilities, limits and turns in central control activities, and their identification with national objectives diminishes, manoeuvring with the regulators increasingly replaces the efforts aimed at actual performance.

In 1968 the reform of economic control and management made profitability a focal point of enterprise concern. Considering that productivity growth is one of the primary instruments for enhancing profitability, it was also expected to play an outstanding role in the set of objectives of Hungarian enterprises. However, several studies offer negative evidence. [3] The reasons include the following:

- (1) the recurrent special emphasis given by economic policy to other objectives (e.g. growth, exports);
- (2) lacking competition, there has usually been the possibility of raising prices instead of reducing inputs;
- (3) state interventions, grants and subsidies weakened enterprise efforts to achieve higher profitability through better performance;
- (4) company identification with national objectives became less marked in the 1980s than in previous years.

4. The Productivity and Performance Conditions for Revitalizing the Economy

The new programme of the government is being prepared at the time of writing this paper and it will be submitted to the National Assembly in September.⁴ The government is working on a programme designed to stop the growth in debt in convertible currencies in a few years and to lay down the bases of economic revival. Discussions about the details of the programme and several of its important elements are still going on - there is not enough space here to present them. I will only give a short summary of what I consider, in the light of the previous analyses, to be the most important elements.

1. The programme has to rely both on a new orientation of economic policy in several respects, and on the resolute continuation of the reform of economic control and management. Further, it has to be complemented by a comprehensive socio-political programme which reaches beyond the economic sphere, which openly exposes our concerns in every field, which provides visible signs of renewal, and which creates confidence, trust and greater joint efforts.

2. Economic policy has to face sharper conflicts resolutely, and in searching for compromises it must not yield to the pressures of the short term again.

The ideas about the programme frequently identify structural adjustment as the most important economic task. This is also considered as the main instrument for improving the balance of trade (first of all, of that transacted against convertible currencies), and for maintaining international solvency.

More in-depth structural adjustment is, however, paralysed if:

- every kind of export against convertible currency is requested and stimulated, and
- imports necessary for the normal functioning, modernization, structural adjustment, replacement of obsolete production lines of firms, and for strengthening market competition are restricted.

If the foreign exchange reserves are insufficient for eliminating these negative factors and if they do not provide the economy with a breathing space, the concept of handling the stock of debts has to be revised (and probably modified).

3. Several years' experience has proved that preferential stimulation of exports settled in convertible currencies does not bring about lasting results. The activities of those firms which export directly and of their suppliers are so intertwined (about *half* of the total Hungarian labour inputs embodied in exported products are contributed by suppliers), that separate preferences for direct exports do not promise success in the longer run without the renewal of the economy as a whole. Beyond that, such treatment weakens the profit motive and cooperation, and as it is not attached to the net foreign exchange yield, it increases demand for imports.

4 The overall programme was approved by the National Assembly and details are being elaborated.

Furthermore, there has to be a greater realization that export possibilities are limited not only by *what* we offer our customers, but also by *how* this is done: at what price, of what quality and with what kind of delivery conditions. Strengthening competitiveness demands both the essential modification of the structure of production and the improvement of quality, productivity and performance. *Structural adjustment and the improvement of productivity, quality and performance have to be treated as equally-ranking first priorities.*

4. The economic leadership is aware that, in the case of faster structural adjustment, it cannot promise firms and employees, stability and security similar to earlier periods. It anticipates greater organizational mobility, labour mobility, demands for retraining and minor, transitory unemployment. In addition, in the next few years a significant decline in living standards and in real wages is unavoidable and this, too, the population has to be made to accept.

Up to now the above situations have been considerably mitigated by the secondary economy. Yet can this situation be tolerated in the long run? Can the low productivity of, and income from, work done in the primary economy increasingly be supplemented by work done in, and income from, the secondary economy?

In agriculture, good solutions have developed for linking the two kinds of economy. In industry (and construction and several other fields), however, there is danger that the secondary economy will suppress the primary. The planned introduction of the personal income tax from January 1988 will, in all probability, strengthen the 'shadow' or 'black' economy. It will probably push back the secondary economy, but it is not at all certain that it will boost the performance of the primary economy.

The boosting of individual performance should be achieved by ensuring that individual incomes primarily depend on performance in the main (full-time) job. This can be done partly by making sure that the full-time job and the income earned there can only be kept by doing honest work; and partly by providing opportunities for earning additional income in the main job (in the full-time occupation) equal to that in the secondary economy.

However, in order for the 'full-time' activity to be competitive with work done in the secondary economy (and in the 'shadow' or 'black' economy), the attainable net incomes should be raised (in line with greater performance). Without a considerable surplus wage fund, this is only possible if the total number of 'full-time hours' and 'full-time jobs' diminishes. One part of the labour released can be taken over by the firms actually struggling with labour shortages, another part by the tertiary sector, while a further part can be taken up by 'small ventures' - that is, if a much greater proportion of them operate as full-time activities (with safer perspectives and greater dynamism) and not as a part of the secondary economy. Such actions will unavoidably accentuate employment problems and tensions; but these should be more than compensated for by greater performance and higher productivity.

5. Confronted with these grave issues of economic policy, what is needed for the revitalization of the economy is:

- a reduction of losses occurring in the noncorporate sphere,
- a higher standard, and socially more effectively controlled, government administration, and, of prime importance,
- higher enterprise performance.

To achieve this, a more advantageous framework should be provided for firms, which in turn have to exhibit, performance-oriented behaviour. Such behaviour can only be expected: (1) if monetary regulation and market impacts are given a greater role; (2) if the direct interferences of central economic management are reduced and become controllable; (3) if the survival, growth and success of firms, the maintenance of jobs and of managerial positions (as well as the size of individual incomes) all depend on performance.

Concerning the further development of the system of economic control and management, the most energy is now being devoted to the introduction in January 1988 of the planned tax reform (value added tax and personal income tax). The professional public is debating many of its details as well as its timing. A prime objection is that the tax reform is not linked to the complex and consistent programme of further development of the system and practice of economic management. (A decision will be taken by the September session of the National Assembly.) Key modifications are needed in two fundamental elements: price and wage control; no generally accepted good solutions are as yet available for these.

6. Formation of the structure of institutions and organizations is also part of the further development of economic control and management. A programme for improving government work and the institutional system has been in preparation for a long time, but practical steps have been slow in following.

As regards enterprises, it is generally accepted that one of the conditions of market competition is to have more actors in the market, and that the overcentralized structure of the economy, and within it of industry, should be modified. Administrative measures have not produced many results in this field. It is now accepted that modern industry needs a smaller number of big and strong firms (or groups of firms) and a wide network of small- and medium-sized enterprises. The flexible enterprise structure should be shaped by natural processes, market effects and the initiatives of firms and entrepreneurs. These should be given freedom of movement in Hungary. As regards the big firms, the way should be opened for the growth of successful enterprises and for the liquidation of the failures. On the one hand, spinning off enterprise groups should be made possible, while on the other there should be sanctions for the abuse of power positions, with a separate autonomous institution created for this purpose.

The small industrial business sector already accounts for about 500,000 people. (This is about 30 per cent of those engaged in industrial activity.) 150,000 people are employed by state enterprises and cooperatives with less than 300 employees, 100,000 are engaged in the private sector (as full-time employees) and 250,000 in the industrial 'complementary workshops' of non-industrial organizations. Beyond that, a further 200,000 people are employed in industrial establishments with less than 300 workers; such establishments are associated with large state industrial firms and cooperatives.

The small business sector fulfils an important and useful role even today, but it does not by far show the innovation and dynamism, that can be found in market economies. To promote it and for a better exploitation of its potential, a government programme is needed. This programme could help the creation, survival, innovation and development of state, cooperative and private small ventures. It would help with advice, training, provision of infrastructure and financial support. It would also eliminate the frequently harmful distinctions - but without providing protection and unjustified advantages.

After completion of the study, on January 1, 1988 a general turnover tax (of VAT type) and a personal income tax were introduced. Simultaneously, several changes were made in the institutional system of government. In May 1988 the Conference of the Hungarian Socialist Workers' Party finally assessed the grave economic and social crisis of the country, and made personnel changes in the Central Committee and the higher leadership. Work aimed at elaborating a conception for the transformation of the system of economic management was accelerated, with the definite aim of building a market economy in the spirit of liberalization and deregulation. In connection with the drafting of the annual plan for 1989, the National Planning Office worked out more precise alternatives for economic policy. Political life has made great steps towards pluralism and the importance of Parliament has grown (though it still has to choose between alternatives which allow only a small scope for manoeuvre). However, the size of the budget deficit has not

allowed a moderation of taxes levied on enterprises and entrepreneurs. The conditions necessary for enlivening and increasing the productivity and performance of the economy were missing at the end of 1988 and the solution to this situation is still faced by the (slowly acting) Hungarian economic management.

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DECENTRALIZATION IN THE STATE-OWNED INDUSTRY IN HUNGARY (1980-1985)

ESZTER BAGÓ

In the 1980s the process of centralization, which for several decades had been the almost permanent organization system of Hungarian industry, came to an end. The Hungarian enterprise structure, which had been very strongly centralized in international comparison, began to change in accordance with the principles of the economic management reform. This had been urged for several years by theoreticians and practical specialists. Thus new types of organization structure have appeared, and these have provided room for the widening sphere of small-scale organizations which, in earlier times, were entirely missing from Hungarian industry. Another initiator of the decentralization process was a series of central decisions (i.e. made by the state administration) which resulted in the liquidation of several large enterprises, and a reduction of the size of others between 1980-85. The aim of the present study is to demonstrate the effect of these measures on the organization of the state-owned industry.¹ The position and behaviour of the decentralized companies, as well as the interrelation between decentralization and market competition, is dealt with in the article written by Mária Móra.²

The Changing Number of Enterprises

The new companies established by the central decisions on decentralization between 1980-85 can be grouped into four classes.

1. The decisions resulted in the liquidation of 10 trusts. From 7 trusts of the food industry, 2 of the engineering industry and one coal mining trust, 88 earlier member companies have won complete independence and, in addition, 17 new enterprises were formed out of the liquidated trusts. From the view of statistics only the latter two measures have increased the number of industrial companies. In terms of statistics the member companies of trusts figured as independent ones before the measures. However, with the liquidation of the trust centres the forms of management and the degree of independence changed markedly in these enterprises.

1 The tables attached to the study were compiled on the basis of the database of the Ministry of Finance.

2 Published in the same volume.

2. Ten large companies have been liquidated between 1980 and 1985 (three of them belonged to the engineering industry, three to the building materials industry, and one each to metallurgy, to the wood-working, the leather and the garment industries). From the earlier factories and manufacturing units of these large companies 57 new companies have been formed.
3. The reduction of the size of 22 large enterprises took place in the course of decentralization (11 in the engineering industry, 4 in the footwear industry, 3 each in the textile and in the building materials industries and one in the food industry). From these enterprises altogether 26 former factory units were detached, and these have since continued to work as independent companies.
4. It may also be attributed to the indirect influence of central decisions on decentralization that, up to 1986, the enterprises have founded a total of 29 subsidiaries by granting independence to some of their earlier factory units. In a certain number of cases large companies have changed their former factory units into subsidiaries in order to evade their complete substitution and separation. Although this has increased the number of enterprises engaged in industry, the subsidiaries' independence is, however, limited - in some cases even more limited than that of some member trust companies was.

In the wake of decentralization 10 large enterprises ceased to exist and 129 new enterprises were set up (100 of which became independent and 29 became subsidiaries). Thus, as a result of the decisions the number of enterprises has grown by 119; this represents an increase of 22.4 per cent as compared to the situation in 1979. According to *Table 1*, the increase between 1979 and 1986 was less than that (110 enterprises, 20.7 per cent), owing to fusions and liquidations of other companies carried out in the meantime.

In the broadening sphere of independent companies operating in industry the decisions on decentralization have also brought about some effects which cannot be demonstrated in a quantifiable form - namely, the degree of independence of the earlier trust member companies has markedly increased since the liquidation of the trusts. Instead of their earlier formal independence these companies are today working under the same conditions of economic management as any other company.

The Changing Structure of Company Sizes

When the sequence of decisions on decentralization started, the organization structure of Hungarian industry could be characterized by its strikingly high concentration as compared to the international level. An important objective of the decisions was to reduce the concentration, number and dimensions of the large enterprises and to grant independence to those organizations - already working within the framework of a large company - capable of operating independently. Thereby, the number of small and medium-size enterprises within the structure of Hungarian industry was increased.

In the sphere of industry administered by ministries the number of large enterprises having more than 1000 employees was 348 in 1979; however, hardly one-tenth of these have been affected by the decisions on decentralization. One-third of the latter have been liquidated. More than half of those enterprises from which some factory units have been detached (13 enterprises), have remained in their original size category. After reorganization a further 8 companies went down only by one category and, altogether, only one has shifted from the group of large enterprises into that of medium-size enterprises. Thus, looking at the decisions on decentralization from the view of the 'mother enterprises', in the final analysis they have not reduced the sphere of large enterprises within industry.

The newly independent companies formed as a result of the series of decisions, account for 15.6 per cent of the total number of enterprises operating in the industry administered by ministries. Owing to their low proportion, with regard to the changing structure of enterprise sizes, they are unable to play a significant role; this would still be the case even if they belonged exclusively to the sphere of small or medium-size companies. At the same time, the distribution of the newly independent enterprises by sizes (see *Table 1*) shows that 34 of them became large enterprises and a further one-third of them - employing 500-1000 persons - are still not 'real' medium-size companies according to the dimensional standards given in the international specialist literature. There are only 34 new enterprises which have less than 500 employees and altogether three small-scale companies have come into existence as a result of the decisions on decentralization.

Taken together the decisions on decentralization have resulted in a number of favourable changes in the dimensional structure of the enterprises. Between 1979 and 1986 the share of small and medium-size enterprises (i.e. with up to 500 employees) in the industry administered by ministries increased from 14.3 to 22.8 per cent; at the same time, the share of those working with more than 1000 employees has diminished from 65.4 to 54.5 per cent (see *Table 1*). The changes in the proportions between size categories are, however, not really significant.

It is noteworthy that among the individual enterprise categories the greatest number is represented by the companies working with 1000-2000 employees; it is notable that a major part of the former trust member companies which have recently become independent belong to these. It is almost certain that the enterprises falling into the bottom group of the size category of large enterprises - though showing a dominant share in the industry administered by ministries - still do not enjoy the advantages of scale available to the really large ones; at the same time, they are already devoid of those advantages given to small and medium-size enterprises. Experience suggests that the predominance of the companies employing 1000 to 2000 persons is an obstacle to the international competitiveness of Hungarian industry and, if this is so, the situation has not been changed as a result of reorganization.

Changes of the Enterprise Structure in Some Particular Sectors

The data given in *Table 2* indicate the changing number, and the dimensional structure, of the enterprises working in the individual subsectors between 1979-1986.

In *mining* the number and distribution of the companies, with relation to their size, have not changed between 1979 and 1986. In the wake of the central decisions, and after the liquidation of the Coal Mining Trust, 9 former member companies became completely independent.

In *metallurgy*, by breaking down a large company in the metallurgy industry and one in the engineering industry, and by granting independence to some metallurgical plants which had earlier belonged to companies of the engineering industry, 14 new enterprises have been developed. Most of these are small and/or medium-size enterprises, 12 of them belonging to the subsector of metallurgy. However, the organization of the three giant metallurgical works has remained intact.

The decisions on decentralization have most strongly influenced the enterprise structure of the *engineering industry*: 20 former trust members have become independent enterprises and 38 new companies have been established. The number of companies in the engineering industry increased by 40 per cent between 1979-1986. The number of the small and medium-size companies has grown from 10 to 46 and

Table 1

**The number and distribution of the companies by categories of size
(1979-1986)**

Year	Sphere of companies	Companies with an employment of								Total number of companies
		1-100	101-300	301-500	501-1000	1001-2000	2001-5000	5001-10000	10001-	
numbers										
1979	Total number of companies	15	35	26	108	149	139	42	18	532
	Former trust members	4	2	3	24	34	13	5	3	88
1986	Subsidiaries	2	7	8	8	4	-	-	-	29
	Newly independent companies	3	17	14	32	27	7	-	-	100
	Total number of companies	46	52	48	146	185	128	23	14	642
distribution (per cent)										
1979	Total per cent of companies	2.8	6.6	4.9	20.3	28.0	26.1	7.9	3.4	100.0
	Former trust members	4.5	2.3	3.4	27.3	39.6	14.8	5.7	3.4	100.0
1986	Subsidiaries	6.9	24.1	27.6	27.6	13.8	-	-	-	100.0
	Newly independent companies	3.0	17.0	14.0	32.0	27.0	7.0	-	-	100.0
	Total per cent of companies	7.0	8.1	7.5	22.7	28.8	19.9	3.6	2.2	100.0

Table 3

Shares of the largest companies in the gross production value of the subsectors
(1979, 1986)

Subsector	1979	1986	1979	1986	1979	1986	1979	1986	1979	1986	1979	1986
	Gross production value, 1000 million Ft ¹		Number of companies ¹		Share of			Ordinal no. of subsectors ranked by structural concentration ²				
					largest	two largest	three largest					
	1979	1986	1979	1986	1979	1986	1979	1986	1979	1986	1979	1986
Textiles and garment industry	16.5	19.3	130	117	9	8	15	13	20	17	53	55
Other industrial products	7.4	8.8	86	72	9	9	13	13	17	17	54	54
Machines and mechanical equipment production	50.4	67.0	105	116	6	8	11	13	15	18	55	53
Baking industry	7.5	10.8	39	38	17	12	21	16	25	20	51	52
Milling industry	20.7	25.6	24	22	9	9	17	18	24	25	52	51
Metalwares industry	22.7	30.1	58	60	11	10	20	19	29	26	50	50
Meat processing industry	34.7	49.4	24	24	19	9	29	18	37	26	45	49
Printing industry	9.0	13.9	36	33	13	12	23	21	31	29	49	48
Furniture manufacturing industry	11.2	13.0	76	50	11	11	22	21	32	30	48	47
Dairy industry	17.1	25.6	24	23	18	15	28	25	35	31	47	46
Handicraft and domestic industry	7.8	8.2	97	86	19	14	31	28	35	33	46	45
Footwear industry	11.8	17.8	60	59	18	17	30	29	41	35	42	44
Poultry processing	9.1	14.1	12	14	27	14	43	27	56	37	36	43
Canning industry	15.2	19.3	17	18	15	14	27	27	38	38	44	42
Electric machines manufacturing	31.9	42.0	31	43	19	17	36	30	48	38	38	41
Knitting industry	7.8	11.0	13	19	15	14	29	27	43	39	40	40
Electric power engineering	31.1	79.5	22	21	12	18	23	30	33	40	-	-
Precision machines industry	19.0	27.9	38	41	16	16	28	29	39	41	42	39
Sugar industry	8.6	3.2	12	11	19	18	33	35	43	46	41	38
Coal mining	17.7	30.8	13	12	18	17	34	32	48	46	-	-
Other manufacturing industries	1.5	1.7	20	14	28	20	42	37	52	48	37	37
Bricks and tiles industry	4.4	5.8	12	12	21	23	34	36	45	48	39	36
Constructional joinery	2.8	3.6	7	16	89	22	92	38	94	50	17	35
Wool industry	9.6	11.0	8	9	31	28	45	40	57	51	33	34
Telecommunication and vacuum technics	33.1	56.5	17	18	27	31	54	47	62	56	28	33
Leather and fur industry	9.1	11.5	29	25	26	24	44	44	58	57	32	32
Fine ceramics industry	3.9	5.2	7	12	85	23	94	43	96	57	14	31
Haberdashery industry	3.1	4.2	11	12	29	28	48	45	69	51	30	30
Cotton industry	16.1	20.9	15	16	32	23	51	45	69	63	23	29
Fertilizers and plant protection chemicals industry	19.0	30.1	7	8	27	27	51	47	69	63	24	28
Wine-making industry	5.7	7.6	9	9	22	37	42	52	56	63	35	27
Iron metallurgy	55.0	72.8	16	24	24	26	43	47	61	64	29	26
Tobacco processing industry	5.2	6.0	7	6	20	24	39	48	58	66	31	25
Distilling and starch industry	4.0	8.0	6	7	32	25	54	47	73	66	22	24
Plastics processing industry	7.8	11.9	25	20	26	29	46	51	66	69	27	23
Pharmaceutical industry	22.2	37.0	12	15	27	31	52	53	67	78	26	22
Vehicle industry	57.6	85.6	21	22	29	29	53	55	68	72	25	21
Gas manufacturing	9.0	34.3	7	6	48	34	65	61	79	76	21	20
Aluminium metallurgy	16.3	27.4	16	14	30	45	46	66	57	77	34	19
Quarry and gravel pit industries	2.0	1.9	3	5	48	41	77	61	100	78	-	-
Organic and inorganic chemicals industry	17.5	31.9	28	17	56	60	69	72	79	81	20	18
Breweries	4.2	7.6	6	6	45	44	68	70	81	84	18	17
Mineral water and soft drinks manufacturing	0.7	1.1	7	9	57	54	71	80	79	88	19	16
Confectionery	11.7	14.1	2	4	63	44	100	77	100	90	7	15
Prefabricated concrete elements	4.2	4.7	6	6	86	85	90	90	94	92	16	14
Glass industry	5.1	9.9	5	6	93	89	96	93	98	95	12	13
Crude oil and gas production	16.7	54.2	6	7	67	70	82	88	96	96	-	-
Oil refining industry	37.9	87.2	5	4	71	77	88	91	95	96	15	12
Flax, hemp and jute manufacture	4.4	6.4	4	4	42	45	82	82	98	98	11	11
Paper industry	11.7	18.7	8	5	94	94	96	96	98	98	13	10
Synthetic and man-made fibre manufacturing	8.5	14.8	2	4	74	79	100	99	100	100	6	7
Building insulation materials industry	1.6	3.8	2	3	58	48	100	77	100	100	8	8
Bauxite mining	1.9	3.2	3	3	59	63	87	89	100	100	-	-
Cosmetics and household chemicals industry	1.8	3.7	2	3	95	92	100	98	100	100	-	-
Other ore and mineral mines	3.1	4.3	3	3	48	52	88	90	100	100	-	-
Sawmills and woodworking industry	1.7	2.3	3	2	58	59	99	100	100	100	10	6
Lime and cement industry	5.8	7.4	1	2	100	98	100	100	100	100	4	5
Rubber industry	7.5	12.1	3	2	99	99	100	100	100	100	9	4
Metallurgy of other non-ferrous metals	5.5	7.2	1	2	100	89	100	100	100	100	3	3
Asbestos-cement industry	-	1.3	-	1	-	100	-	100	-	100	-	-
Silk industry	2.4	2.8	1	1	100	100	100	100	100	100	2	2
Vegetable oil industry	5.3	10.0	1	1	100	100	100	100	100	100	1	1

1 Including both state-owned and cooperative industry.

2 The rank order has been arranged on the basis of the share of the three largest companies. In cases, in which the shares of the three largest companies were equal, we have taken into consideration the shares of the first two companies or the shares of the first company too.

Table 2

The number and distribution of the companies by categories of size and by sectors
(1979-1986)

Year	Sphere of companies	Companies with an employment of								Total number of companies
		1-100	101-300	301-500	501-1000	1001-2000	2001-5000	5001-10000	10001-	
numbers										
MINING										
1979	Total number of companies	1	1	1	3	4	6	7	3	26
1986	Former trust members	-	1	-	-	-	-	5	3	9
	Newly independent companies	-	-	-	-	-	-	-	-	-
	Total of companies	2	2	1	3	3	5	7	3	26
ELECTRIC POWER INDUSTRY										
1979	Total number of companies	-	-	-	9	6	8	-	-	23
1986	Former trust members	1	-	-	-	-	-	-	-	1
	Newly independent companies	-	-	2	5	7	8	-	-	22
	Total of companies	-	-	2	5	7	8	-	-	22
METALLURGY										
1979	Total number of companies	-	3	2	4	7	9	1	3	29
1986	Former trust members	-	-	-	-	1	1	-	-	2
	Newly independent companies	-	3	4	2	3	1	-	-	13
	Total of companies	2	4	5	8	7	8	-	3	37
ENGINEERING INDUSTRY										
1979	Total number of companies	2	4	4	13	37	50	18	7	135
1986	Former trust members	-	-	1	3	8	8	-	-	20
	Newly independent companies	-	8	4	14	10	2	-	-	38
	Total number of companies	13	16	17	34	50	47	7	5	189
BUILDING MATERIALS INDUSTRY										
1979	Total number of companies	-	1	1	-	12	3	2	2	21
1986	Former trust members	-	-	-	-	-	-	-	-	-
	Newly independent companies	-	-	-	7	7	1	-	-	15
	Total number of companies	3	2	-	9	17	2	2	1	36
CHEMICAL INDUSTRY										
1979	Total number of companies	2	6	5	7	13	11	5	1	50
1986	Former trust members	-	-	-	-	-	-	-	-	-
	Newly independent companies	-	1	-	-	-	-	-	-	1
	Total number of companies	8	8	4	7	15	11	3	1	57
LIGHT INDUSTRY										
1979	Total number of companies	3	7	7	26	20	36	8	2	109
1986	Former trust members	-	-	5	-	-	-	-	-	-
	Newly independent companies	-	4	5	7	5	1	-	-	22
	Total number of companies	7	12	13	31	36	30	4	1	135
FOOD INDUSTRY										
1979	Total number of companies	7	12	4	46	49	16	1	-	135
1986	Former trust members	3	1	2	21	25	4	-	-	56
	Newly independent companies	3	1	1	2	2	1	-	-	10
	Total number of companies	11	7	4	49	49	17	-	-	137

the number of the largest ones having more than 5000 employees, has decreased from 25 to 12. In the dimensional structure of the engineering industry the gravity centre has shifted from those enterprises with 2000-5000 employees to the lower category next to this, having 1000-2000 employees. While this is undoubtedly an advantageous situation, the question marks linked to it have already been mentioned in the foregoing.

In the branch of *building materials* the growth in the number of enterprises has also been significant: in this sector, in 1979, only 21 enterprises were operating; however, by 1986 this figure had risen to 36. Seven of the new enterprises were established by breaking down a large company which belonged to the fine ceramics industry, four by the liquidation of companies of the quarrying and gravel-pit industry, and the rest by separation from large companies. In this sector - similar to the situation found in the engineering industry - the decisions on decentralization strengthened the dominance of large enterprises working with 1000-2000 employees and resulted in the development of 12 new enterprises with less than 1000 employees.

The enterprises of the *chemical industry* have not been affected by the decentralization decisions of 1980-85. The single new independent company working in this sector has been developed by separating one of the leather industry's large enterprises and placing it into this one, owing to its product structure. The increase in the number of enterprises working in the chemical industry - and, within that, the number of small enterprises - has been generated by regrouping companies from the local councils into this category of the state-owned industry and/or by founding joint ventures, independent from the decisions on decentralization.

After the engineering industry, the number of newly independent enterprises is greatest in the *light industry*. In this sector 22 new, decentralized companies have been set up. Within the enterprise size structure the share of enterprises working with less than 500 employees has increased from 15.6 to 23.7 per cent, while the weight of large enterprises with more than 2000 employees has strongly declined (from 42.2 to 25.9 per cent). Also, the number of enterprises in this sector with 1000-2000 employees has increased markedly. The decisions on decentralization have had their greatest effect on the enterprise structure of constructional joinery, where the earlier single enterprise has been separated into 9 new ones. In addition, a number of enterprises became independent in the following industries: textile-garment (4), footwear (4), knitting (2), leather (2) and cotton (1). In the latter sectors, however - taking into account the original number of enterprises - the change in the enterprise structure has not been significant.

The *food industry's* enterprise structure has remained virtually unchanged between 1979-1986. At the same time, due to the effect of the central decisions, the management structure of the enterprises in the food industry has changed significantly: 40 per cent of them developed into independent companies having formerly been members of trusts. This change, though not demonstrable by statistics, has meant decisive changes in the autonomy of company management, in market relations and in enterprise behaviour. The breaking down of trusts has also been accompanied by the establishment of a few new enterprises. Of these, the smaller ones were formed for fulfilling certain management, selling, and servicing functions in their role as joint ventures of the former member companies of the trusts.

Changes in the Enterprise Structure of the Subsectors

Two of the most important impacts expected from decentralization are the elimination of the monopoly positions which developed earlier in some particular markets, and the diminution of the powerful centralization which was apparent in the

structure of some other markets. Analysis of the structure of the individual subsectors, based on the homogeneous product groups belonging to each one of them or on the process of production technology, ought to present an approximately accurate picture about the conditions of market competition.

Studying the effects of the decentralization decisions, what we have found with regard to the development of the dimensional structure of enterprises, applies also to the enterprise structure of the subsectors: namely, that the trend of changes is favourable but the changes are not really decisive.

About three-quarters of the subsectors (31 subsectors) were not affected by the decisions, while in the others (13 subsectors) the only result was a single new enterprise. In such cases the (relatively homogeneous) subsectoral market structure remained virtually unchanged. In 10 subsectors 2-4 new independent enterprises were established. All in all, the central decisions have markedly transformed the enterprise structure of only six subsectors; thus new independent companies were formed in the following subsectors: manufacture of machines and equipment (14), iron metallurgy (11), metalware (11), constructional joinery (9), manufacture of electronic machines and instruments (8), and fine ceramics industry (7). The enterprise structures of the subsectors of the garment and the light chemicals industries - which are especially powerfully concentrated in international comparison - have not been significantly transformed by the reorganizations.

With regard to market structure, it is necessary condition for developing market competition that relatively great numbers of enterprises work in the market, and that their market share does not enable any one of them to reach a dominant position in the market. The changes in these organizational conditions for market competition can be traced in Table 3; Tables 4 and 5 summarize the data of Table 3.

Table 4

Number of manufacturing subsectors, according to the percentage share of the three largest companies in gross production value

Year	Share of the three largest companies in gross production value of the subsector (per cent)					Number of subsectors
	-30	31-50	51-70	71-90	91-100	
1979	6	12	15	5	17	55
1986	9	12	13	7	15	56

The most widespread indicator for characterizing the competitive conditions, using one parameter only, is the *share of the three largest enterprises* in total production or sales. The share of the first three enterprises having the largest gross production value within that of the whole subsector in the 55 subsectors of the manufacturing industries declined in 26 subsectors (47 per cent), increased in 16 subsectors (29 per cent), and remained unchanged in 13 subsectors (24 per cent). The change in the share of the first three largest enterprises has, in general, been minimal; thus the concentration in the rank order of the subsectors has hardly changed during the 7 years in question. In 1986, there was no change in the 10 subsectors where three or even less companies dominate the market. In four of the subsectors (in the production of mineral water and soft drinks, in wine production, in the tobacco industry and aluminium metallurgy) the shares of the three largest

companies have grown considerably. There were altogether only six subsectors (meat and poultry processing, confectionary, the manufacture of electric machines, constructional joinery, the fine ceramics industry) where a significant decrease in the share of the three largest companies could be found. However, even in these subsectors - with the exception of meat processing - the share of the three largest companies in the total production has remained at more than 30 per cent.

In addition to the almost negligible changes recorded by the above indicator (which characterizes the concentration of the market structure of the subsectors) the share of the *largest company* in gross production value also shows no significant changes. Although in more than half (i.e. 31) of the subsectors the share of the largest enterprise decreased, in 10 of them it has not changed at all, and in 14 it has even increased. The changes of the shares were, in general, also not significant; the high shares, which had underpinned the monopoly positions of the past, remained unchanged. The earlier dominant position of the largest company ceased to exist only in the constructional joinery, fine ceramics and confectionery industries. The sphere of subsectors where one single company had in the past been dominant (by a share of 90 per cent or more) has also not changed. (This includes vegetable oil processing, the silk industry, the metallurgy of non-ferrous metals, the rubber industry, the lime and cement industry, the cosmetics and household chemicals industry, and the paper- and glass industry.)

Thus it seems that the central decisions on decentralization have had only insignificant effects on the changing enterprise structure and on the changes of concentration in the subsectors. The decisions have not involved the most concentrated subsectors, and the majority of these are still working with a very low number of enterprises. In almost half the subsectors the share of the largest company exceeds 30 per cent of the production value of the subsector; this proportion is similar to the conditions in 1979 (see *Table 5*).

Table 5

Number of manufacturing subsectors, according to the percentage share of the largest company in gross production value

Year	Share of the largest company in gross production value of the subsector (per cent)						Number of subsectors	
	-10	11-20	21-30	31-50	51-70	71-90		91-100
1979	4	14	13	6	5	5	8	55
1986	6	15	13	7	3	5	7	56

Therefore, the figures show that decentralization has hardly touched those large enterprises which have enjoyed a monopoly position. With the exception of 9 of the subsectors, in all of them the share of the three largest companies surpasses 30 per cent of the gross production value of the subsector (*Table 5*). (At the same time, the specialist literature suggests that in a market structure which furthers the development of market competition the share of the three largest companies should be less than 30 per cent.) Altogether two of the subsectors where the three largest companies were dominant in the market have been affected by the decisions on decentralization (constructional joinery and fine ceramics). At the time of writing there are still 15 subsectors in each of which three companies represent almost the total volume of domestic production.

Conclusions

There has been a more than 20 per cent increase in the number of enterprises in the state-owned industry within five years - this does not suggest that the changes have been insignificant. However, let us keep in mind that the basis we are comparing this figure with is very low! Even this growth in the number of enterprises has not been adequate for ensuring that, in the highly centralized structure of Hungarian industry, the organizational conditions of competition in the particular markets will in future be considerably better on a subsector level.

The distribution of enterprises by size has hardly been changed by decentralization; its main effect has been to strengthen the sphere of companies working with about 1000 employees. Consequently, in the organization of the state-owned industry, the over-representation of inflexible large companies (regionally scattered in the country and mostly enjoying a monopoly position in their section of market) continues to be typical. On the other hand, the granting of independence to a wide range of factory units and enterprises capable of operating autonomously has not been realized. Thus the functions of the small enterprises required for the effective operation of the economy remain unfulfilled within the organization of the state-owned industry.

The series of decisions made on decentralization in 1980-85 broke the process of centralization in state-owned industry, which had lasted for several decades. Decentralization has put an end to a certain period of changes in the organizational structure of industry, and it may represent the first steps towards a brand new means of developing the enterprise structure.

Nevertheless, it seems that further decentralization is necessary in the state-owned industry. The ways of achieving this are, however, not yet clear. The legal possibilities of central intervention in the organization of the enterprises are already limited today; this means that central economic management can only strengthen the decentralization process by indirect means. The most reasonable and efficient solution seems to be to leave the changes of organization to the impacts of the market and to the independent decisions of the companies. However, the automatisms of organizational development can only come into action within narrow limits, owing to the undeveloped state of domestic market relations.

Further success of the decentralization process, which is a fundamental part of the comprehensive development of the economic management system, depends on further reform measures and political decisions.

MORE ENTERPRISES – STAGNANT COMPETITION (1980–1985)¹

MÁRIA MÓRA

The Background to the Process of Centrally Controlled Decentralization

Since the 1968 reform, the strengthening of organizational centralization in the Hungarian economy has continued. Up until the early eighties the number of enterprises had gradually been decreasing. The centrally directed campaign of fusions between 1961–1963 and, later on, the centrally sanctioned mergers (which aimed at solving the various economic difficulties of large enterprises) have led to the development of huge companies operating several manufacturing plants. Centralization has also been accompanied by a decline in the number of small and medium-size companies. In extreme cases the entire production of a whole subsector came to be produced by one organization; this was known as a national large enterprise. Frequently, the amalgamations were not followed by the proper concentration of capital, nor by the development of rational vertical relationships. Thus, the artificially-created large enterprises were unable to utilize their theoretical advantages because of their magnitude. The initially isolated strategies of economic development, which later on encouraged the exploitation of the comparative advantages inherent in foreign trade without success, as well as the companies' responsibility for supplying the domestic market, resulted in the maintenance of *product structures which were too wide and were also broken down into fragments*. In addition, there was a lack of reasonable specialization. Therefore, instead of productive collaboration, the various plants were only connected by the strong functional centralization carried out by the company centre. In other cases the company centre, in order to justify the fusions, tried to establish economically groundless production relationships.

International comparisons indicated that in the Hungarian economy (and, within it, in industry) the degree of structural centralization was unparalleled. Especially conspicuous was the low number of small and medium-size enterprises, and the weakness of the sphere of small-scale ventures. Thus, in the economic literature of the seventies it was increasingly recognized that the enterprise structure which

¹ The study was written in the framework of the research project investigating the impacts of central decisions on decentralization. The project was supported by the Academic Research Fund. For the summary of results see [1].

had developed in the meantime actually hampered successful adjustment to the changing conditions of the domestic and foreign markets. It also became clear that the given organization structure did not conform with the basic principles of the 1968 reform of economic management. This aimed at bringing into the foreground the regulatory role of the market, instead of control according to the instructions of the central plan. Although researchers dealing with the question acknowledged, almost unanimously, the necessity of releasing enterprises from the over-centralized structure, no agreement was achieved with regard to the desirable way of carrying out decentralization. Advocates of one opinion claimed that, along with the unfolding market mechanisms, re-arrangement of the structure had to be left to the organic self-development of the organizations [2]. Another standpoint emphasized that, owing to the unequal power relations and organizational monopolies, the creation of a more balanced enterprise structure could not be left merely to the regulation of the market and to the organic development of the organizations. Thus it was believed that a really significant decentralization would only be possible with the initiative and effective support of central economic management [3].

The economic policy decentralization has, from the start, been controlled from above. According to the July 1979 resolution of the Central Committee of the HSWP, the conditions of organization, decision-making and finance which - it is hoped - will assure the earliest achievement of the economic-political objectives, also have to be created in the enterprise sphere. In the wake of this resolution, between 1980-1986 the organization structures of several large enterprises have been decentralized. The decentralization was based on decisions of the central bodies of economic management (ministries). This circumstance - supplemented by the dynamic increase of small-scale ventures - *stopped the centralization process which had been prevalent for more than three decades, and the number of enterprises began to grow again.* As a result of a series of such decisions 10 trusts ceased to exist in the industrial sector administered by ministries, 10 large companies were broken down and the size of 22 large enterprises were reduced. These figures do not include companies engaged in industrial services. However, along with other amalgamations carried out in the meantime, by the end of the period the number of decentralized enterprises was 110 higher than it had been at the outset of the reorganizations.

The Idea of Strengthening Competition in the Decision of Decentralization

Beyond the transformation of the enterprise structure, the achievement of other objectives and the starting and stepping up of several favourable economic processes were also expected from the reorganizations.² Here we have no room to

2 According to the Guiding Principles of the Coordination Committee responsible for the programme dealing with the modernization of the organization system of the enterprises, the enterprise structure has to

- support, more than was the case earlier, the improvement of competitiveness,
- allow for flexible adjustment to domestic and foreign market conditions,
- support the increasing success of foreign-trade activities, as well as improving domestic supply widening the range of choice,
- create favourable conditions for intensifying the interests of the individual workers and collectives,
- as a result of all these, self-financing units have to be developed, which are capable of economic development; state subsidies should be reduced." ([4] p. 2)

consider the reality of all the results expected from decentralization, nor can we compare their fulfilment. This paper limits its attention to the question of whether or not decentralization has brought about some modification in the power relations on the market, and whether or not the reorganizations have offered some opportunities for revitalizing competition in the commodity market.

In economic literature and in scientific public opinion, the need to increase competition has been an important argument supporting decentralization. At the same time the decision-making mechanism for bringing about the reorganizations and the actual way of implementing decentralization, have left few opportunities for realizing the ideas on the development of real competition. The fact that the aim of strengthening domestic competition was not explicitly formulated in the guiding principles of the Coordination Committee showed in advance that the views of competition had been pushed aside. During their implementation, the decisions were made on the basis of individual reviews of the companies concerned and not on studies of a particular section of the market. In the course of making the decisions on reorganizing the companies, the power relations in the market of their particular products have, in general, not been considered.³

In the second phase of the reorganizations the situation has changed somewhat: "the government wished to assign an ever increasing role to the considerations and methods of building up the market and, within that, of eliminating monopoly positions." ([4] p. 121) During the preparation for the changes of 1985, one of the working committees of the government dealt precisely with "defining the tasks of organization development which will support the unfolding of economic competition." ([4] p. 128) The comprehensive reviews aimed at improving competitive positions were finally related to 14 product groups and 78 industrial companies - yet they have not brought about any significant results. (To be more precise, they resulted in one complete breakdown and three separations.) With the passing of time the market-centred, sub-sectoral investigations shifted increasingly towards activities preparing for the new forms of company management. In the course of the actual decisions, the general arguments serving the strengthening of competition - if they ever existed - were defeated all along by the positive approach which insisted on the viewpoints of production and operation, and laid stress on the difficulties of transition.

From the aspect of eliminating monopolies, the creation of organizational conditions for competition played no part in making the decisions, and the reorganizations modified the power relations in the market merely *incidentally* - i.e. as a concomitant phenomenon. The intensity at which this additional effect became prevalent, depended almost entirely on other elements of the economic environment.

In the following I am going to examine how the reorganizations and other measures taken in the given period influenced competition in the commodity market. Next to that I shall review the features which characterized the market behaviour of enterprises after they became independent, i.e. those factors which impeded the involvement of competition.

³ On the mechanism dealing with the decisions on reorganization, the opportunities for asserting contrasting interests, the systems of argumentation employed, and the possibility of replacing one set of arguments with another, see: [4, 5, 6].

The Changing Condition of Competition in the Commodity Market⁴

1) *Free decision-making by producers and sellers (buyers)* The changing framework of organization and the independence of factory units, directly increased the liberty of the actual producers in their decisions. This was because the short-term and the long-term decisions were shifted from the former centres to a lower level - namely, to the newly independent companies. In the early 1980s some other provisions also widened the enterprises' jurisdiction of decision-making. Thus the liberty of companies in defining their product range was also increased. In certain areas (e.g. in the food industry) the possibility of selecting trading partners or markets was improved by the abolishment of the earlier limitations. The introduction of the new forms of company management also weakened the dependence of enterprises on ministries.

2) *Large number of producers and sellers and the distribution of their market share such that none of them is dominant on the market* Reorganizations have changed the enterprise structure of Hungarian industry in a favourable direction but they have involved only a narrow sphere of enterprises (hardly 10 per cent of the companies employing more than 1000 persons in the industries administered by ministries). According to measures taken at the end of 1986, 100 new companies and 29 subsidiaries had come into being and 88 member companies of trusts had become independent.⁵ Although in some subsectors the changes have improved the organizational conditions of competition, they have not essentially modified the distribution of enterprises by categories of size.⁶ Organized monopolies in general continue to exist and the number of enterprises had increased to a significant extent only in six subsectors (the machinery and equipment, iron metallurgy, the metallic goods industry, constructional joinery, electric machines and instruments, and fine ceramics). The increasing number of enterprises has still not meant the creation of parallel product structures, since within the former large enterprises a very strict division of the product ranges prevailed.

In 1986, out of the 56 manufacturing subsectors, only 9 could be found in which the share of the largest companies in the gross production value did not exceed 30 per cent. In half the subsectors the weight of the three greatest enterprises accounted for more than 60 per cent and in 15 cases it exceeded 90 per cent of gross production. Furthermore, each of the subsectors consisted of only a few enterprises and the distribution of the market shares - despite the decreasing concentration - allowed for the creation of conditions for competition in exceptional cases only. At the same time, the pressing requirement to achieve equilibrium meant that even imports could only become temporary means of strengthening competition - here and there - in some market sections.

3) *Unconstrained entry in the market* The shortage of resources is a general characteristic of the period under analysis. This shortage normally impeded the companies in starting any new activities. However, in areas where decentralization has increased the number of independent producers engaged in spheres close to one another and having similar skills and manufacturing culture, it has also *potentially*

⁴ I have reviewed the development of the conditions of competition on the basis of the criteria given by Z. Román ([8] pp. 79-80).

⁵ For the sake of comparison: In the course of the campaign of fusions the number of enterprises in the state-owned industry decreased by 392 from 1962 to 1963. The decrease between 1963 and 1980 was 195. (Source: [9] p. 14) Though these data do not refer merely to the industries administered by ministries but to the whole of state-owned industry, they are suitable for comparison.

⁶ For further details see the study of E. Bagó, also published in the present volume.

reduced some obstacles preventing entry to the market. The growing number of companies might, in the long run, also contribute to the abolishment of boundaries between the production profiles. A producer manufacturing similar products should find it easier to make up his mind to enter a market section (of course, beside promising income relations) - namely, easier than one which has no experience in the given area. Hence, the opportunity for putting an end to some monopoly positions may be an important indirect effect of decentralization.

4) *Developing prices by adjusting to the market relations (i.e. free-pricing)* Though the sphere of those prices fixed or limited by the authorities has gradually narrowed down, the regulations of pricing - i.e. following the export prices - has not allowed prices to reflect the relations of supply and demand on the domestic market. Even in fields where, in principle, free pricing has been prevalent, the companies could assert their endeavours to raise prices only after some lapse of time - and then only after entering into lengthy bargaining with the supervisory authorities. (In the given period, under the prevailing conditions of regulation, the enterprises have been unambiguously interested in increasing their prices - price reduction remained a possibility only in principle.)

5) *The summarized capacity of the producers and sellers actually and potentially present in the market should exceed the demand* The relations of demand and supply have not been directly influenced by the changing organizations. In fact, with regard to market equilibrium, the reorganizations may be considered to be neutral. However, it has to be recognized that decentralization came to pass at a time of greatly decreasing demand and purchasing power. Thus, in several market sections demand and supply came to approach one another. In many spheres the accumulated commodity stocks grew beyond the needs; the increased number of participants in the market had to adjust themselves to a narrowing (stagnant) demand. Deeper surveys, however, indicated that this oversupply was only a relative one; namely, the stocks became unsalable because of their given quality parameters and prices. Quantitative oversupply was often accompanied by a significant shortage in assortment and range of choice.

6) *Assuring clear rules of the competition, applying them to everybody ensuring they are observed, and providing the conditions for fair competition* The central will to create the right conditions for competition has been reflected most unequivocally in the legislation connected with competition. Law IV of 1984, on the prohibition of unfair economic activities, prepared the legal framework for competition. Furthermore, decree No. 37/1984 of the Council of Ministers dealt with market surveillance and prepared, at least in principle, the institutional and organizational conditions for controlling competition. Practical experience, however, still shows some contradictions; for example, the law does not give a satisfactory basis for preventing the misuse of monopoly positions: "The content and functions of market surveillance aimed at protecting competition have not developed yet." ([10] p. 66)⁷

A rough examination of the conditions for competition shows that in the early eighties the conditions for competition in the commodity market, if only to a small extent, generally changed in a favourable direction - at least, they certainly did not worsen. To some extent the measures of decentralization have also contributed to the improvement of these conditions, either directly or indirectly.

7 The separation of the institutional frameworks for operative market surveillance and competition surveillance might be a means for strengthening the overall surveillance of competition.

The Market Behaviour of the Newly Independent Enterprises⁸

In analysing the effects of reorganization, it was a central question as to how the changed conditions of competing were reflected in the economic management and market behaviour of the newly independent companies. Since in several areas decentralization coincided with a significant decrease of demand, the new enterprises often had to respond to market situations which were different from earlier ones. With regard to the success of adjustment, it was a decisive fact that the units which became independent sensed directly the changing conditions. These conditions attempted to remove the role of the large enterprise centres which had previously tended to blunt the effects of the environment. The survival of individual enterprises came to depend on *subjective elements*. Thus the creative powers released in the wake of decentralization, the pressure to prove capabilities, and the compelling force of growing responsibility played decisive parts in providing new inspiration for enterprises. Changing enterprise behaviour was spectacular in the spheres where the subjective factors were (even in themselves) sufficient to call forth movements in a positive direction.

The fact that the connections with the market and the state budget became direct, made the adjustment to the demands of clients and the requirement of profitable operation more important for the newly independent companies than had formerly been the case. Therefore, after they gained independence, the enterprises tried to modify their product pattern by increasing the share of those profitable products which were in high demand on the market. However, these objectives were limited to a great extent by the existing production circumstances (in the short run) and by the shortage of capital (in the long run). Hence, instances demonstrating a radical change in the product pattern were only sporadically found. The basic change was expected to occur when the separated unit - whose former task had been to cover the demand of the mother enterprise - had lost its original market by ceasing earlier production connections. In such cases the introduction of new products would then become a basic condition of survival. Since, however, in most cases horizontally organized enterprises were decentralized, the aforementioned position was not typical.

More frequently, companies changed their product structure by *changing the proportions between their existing product groups and by modifying the rate of development in some particular product group*. When the demand and their production capacity allowed for it, they increased the share of those products with a greater profit content and marketable for higher prices. In some cases (e.g. in the footwear industry) enterprises insisted on producing these articles even when in the market cheaper products, in the medium price category, were in demand. Developing products by paying more attention to the demands of clients, and a more rapid response to the changes of demand were typical in the sphere of the newly independent companies. The endeavours aimed at improving quality and range of choice also grew stronger. Replacing 'old' products by new ones within the given product group has accelerated significantly. At the same time, the enterprises have not made voluntarily efforts to drastically and immediately cut the production of their less profitable, or even loss-making products. The explanation for this is that in the period in which organizations were being changed and markets were becoming harder the enterprises were afraid of the possible uncertainty stemming from

⁸ We have studied the effects of reorganization on the operating conditions and on the market behaviour of enterprises by carrying out case studies. Altogether 10 case studies were made; these furnished us with information concerning approximately 30 newly independent organizations.

cutting any lines of production. Instead, they tried to improve the efficiency of their economic operations by restricting material and energy costs and reducing the proportions of overheads.

Since achievable profit is not exclusively linked to the domestic market, independent enterprises were able to reach significant improvements of their economic results by *rearranging their sales among the various markets*. Changing the ratios between the products destined for different markets (to the convertible currency markets, to the socialist market, and to the domestic ones) can be seen as an important result of recently gained independence.

Following the reorganization, a *decline or stagnation of exports to capitalist markets* was often experienced. Beyond the difficulties of the changeover, this halt can be traced back to deeper causes. The decentralized units, owing to their looser contacts to the supervisory authorities, (and to their smaller size), felt the pressure of the centre, which urged the increase of exports against dollar currency, to a lesser degree. Hence - especially in the beginning - their decisions were 'multicoloured' and 'shaded', rather than being characterized by the one-sided endeavour of exporting.

At the same time the *efforts to extend sales to rouble markets* were also typical. These efforts were not primarily motivated by considerations of effectiveness, and even the achievable (annually changing) favours of regulation were only secondary. The enterprises tried to increase their rouble incomes because of the stability and better planning possibilities of the markets of the socialist countries, and because of the attractiveness of the lower levels of requirements and softer conditions. In other cases the newly independent enterprises, having been pushed out from other markets, were forced to attach their development to the markets of the CMEA countries.

The export market rearrangements registered for the decentralized units have not reflected the central intent. Of course, from the view of the enterprises such a situation might be considered justified and reasonable. This bears witness to the fact that a regulation mechanism which could produce better harmony between the objectives of central economic management and company behaviour cannot really be detected in the Hungarian economy. In a more decentralized enterprise structure such mechanisms would be even more necessary, since the growing number of enterprises in principle reduces the possibilities of individual intervention.⁹

In some cases the newly independent enterprises do not respond to the increasingly stringent environmental conditions by resorting to the market. Sometimes the successor companies have tried to achieve more favourable conditions of restructuring - and also favours with regard to regulations - by coordinated, uniform action towards the supervisory authorities. In addition, recentralizing efforts were aimed at restoring the power relations between suppliers and purchasers - these relations having in the meantime become disadvantageous. In the trends of recentralization, it has also been significant that, with the cessation of the central functions of the large enterprises in collecting and allocating the resources (i.e. due to the lack of a capital market), the independent companies tend to assume that their development ideas can only be realized by concentrating their available resources.

⁹ The connection between decentralization and the weakening role of central management is not exactly clear. According to some authors (e.g. Vince [7]), the reorganizations served precisely the improvement of the position of the central economic management, as against the excessively powerful assertion of the large enterprises' interests. It is obvious namely, that in cases where there are more smaller companies, the supervisory bodies are less able to review the activities of individual producers to the extent that essential interventions can be made.

Finally, the examination of the market behaviour of decentralized companies confirmed that, without a consistent and comprehensive reform, reorganizations that involve only a relatively narrow sphere of enterprises are not capable of bringing about radical changes. Thus, although the enterprises which become independent sensed *more directly and intensively* the effects of the environment, and although they have been seeking ways of action suitable for achieving their interests with greater energy and ambition, their arsenal of tools and their typical responses have not differed from the rest of the Hungarian enterprises. Thus they have modified their production patterns only slightly, they have attempted to increase prices, they have turned to markets of lower requirements, and they have searched for preferences and/or favours of regulation.

The Factors Hindering the Evolvement of Competition

The growing number of enterprises appearing between 1980-1986 has not entailed a significant strengthening of competition. The reason for this can be found in the general economic conditions accompanying decentralization. The fact that *equilibrium in the domestic market was approached as result of heavy restraints on demand and not of increased supply is of decisive significance*. The decreasing demand represented a certain approach to equilibrium in terms of quantity, but it did not improve the structural conformity between demand and supply. This is because no adjustment on the part of the producers followed it. In a difficult and constantly deteriorating economic situation and in a period of restrictive regulation and strong concentration of resources, the companies (independent of their size) have possessed *no such means which could enable them to react to the adverse changes of market relations*. It was useless for the enterprises struggling with selling difficulties to recognize the areas in which they could extend their sales if they could not carry out the necessary changes. *The shortage of resources that should be freely obtainable is the most important hindrance to the enterprises' adjustment to the market*; the liberty of decision-making for the participants in the market is also rendered illusory because of the shortage. It was in vain that decentralization increased the number of organization that could make independent, free decisions if, owing to the regulations growing ever more stringent, the area where they could make real decisions was continuously narrowing. *The given technological level and available capacities imposed limitations on short-term adjustment to the market with respect to structure and quality. The shortage of resources indicated that the existing technological processes of production would be conserved for the foreseeable future and made it impossible to build up parallel capacities needed for adjustment to the market and/or for aiding the development of competition.*

The constraints on adjustment to the increasingly strict conditions of the domestic market have been alleviated slightly by the fact that enterprises have been able to increase their exports to the socialist countries. Enterprises have also been helped by the fact that the supervisory organs granted regulation favours to those able to increase their exports against dollar currency regardless of economic efficiency.

The organizational conditions of competition have changed favourably in a period when the *central economic management* (by prompting exports, by strictly restricting imports and by collecting an ever growing share of enterprise incomes) has pursued activities which - if not in their intents, but certainly with regard to their results - have tended to curb competition.

The failure to conduct a consistent reform process has further deteriorated the chances of generating competition. The general shortage of resources has been ag-

gravated by the lack of a suitably operating capital market. Without the mechanisms of a capital market, even the development projects which might have achieved a faster than average return and which promised greater yields have not been implemented and no possibility has been given to bridging over transitory economic troubles by employing the means of the market. The lack of alternative opportunities for investment leads to the immediate, extensive spending of those monetary means left with the enterprises - with no consideration being given to efficiency. The fact that even the resources left with the enterprises have not been able to move towards the promising areas has been a further substantial obstacle to competition.

Also, due to the insufficiency of the reform, the elimination of the contradictions in measuring performance has not been carried out parallel with decentralization. Furthermore, no objective yardstick has been found which could be suitable for unequivocally judging the effectiveness of certain organizations or activities. On the other hand, *the uncertainty of evaluation, from the outset, delimits the involvement of a desirable selection*, because it prompts the supervisory organs to equalize the differences between enterprises. In the course of reorganization, the companies engaged in similar areas have found themselves in very different positions. This has not been due to differences of performance but because of earlier regrouping of the assets and the financial arrangements which accompanied decentralization. In the future this may lead to subsequent corrections and to interventions in the market processes. Therefore, *inequality of starting conditions* could, in itself, eventually be a factor hempering market competition in the long-run.

The reorganized enterprises have been struggling with difficulties which are generally characteristic of the Hungarian economy, i.e. difficulties of purchasing imported materials and difficulties in obtaining some basic packaging materials. Their situation has been special only to the extent that the *reduction of their size* in the wake of decentralization has *enhanced their dependence on their suppliers* (clients). This is because of the modified power relations between the organizations.

Our present survey has also confirmed that imbalances in the market are not independent from the activities of trade. The intermediate role of trade has very often led to a reduction of the adjustment of the producers to market demand. The marketing network which does not conform to the characteristics of the products and the conservative ordering policy of the trading companies have contributed equally to the deepening deficiencies of area and structure. The analysis of the (often monopolistic) purchasing and selling relationships indicated that the potential effect of the reorganization (which was intended to instigate competition) has also been weakened by the fact that decentralization has affected only some particular enterprises, and not all the organizations engaged in the production and distribution of the given range of products.

Furthermore, adjustment to the market has also been made difficult by the lack of labour (both in terms of quality and numbers), by the vertical division of labour, by the insufficient cooperation relations and by inadequate discipline with regard to observing the agreements laid down in contracts.

Our surveys, as well as our experiences, verified that since the reorganizations there has been no intensive competition between Hungarian industrial enterprises, and no real differentiation of the participants in the market. The factors hindering competition have proved to be stronger than the effects stemming from the favourable changes of the competitive conditions (and, within these changes, from the increased number of enterprises). With regard to the speed and intensity of the responses given to the impulses coming from the market, some changes can be observed in the market behaviour of the enterprises. Such changes, however, can only be detected in those elements of enterprise behaviour which are easy to bring about, i.e. in areas where there is a desire to demonstrate the strength released by becoming independent; in such cases the will to act is in itself enough to ini-

tiate movement. However, it is to be feared that with the passing of time - with economic environment, the standards of behaviour prevalent in the economy and the unchanged character of the remaining regulations - the subjective advantages of the newly independent enterprises will increasingly lose their effectiveness. It is also to be feared that the very limited impacts of reorganization on the enterprises' market behaviour may eventually come to nothing.

The reorganizations of the eighties have failed to bring about the organizational framework necessary for implementing a consistent reform. The question of organization has remained unsolved. Consequently, the central economic management which declared the reform will soon have to face the fact that it seems necessary to transform the enterprise structure from the centre; thus it must take a definite and unambiguous stand if it deems it necessary to rearrange the structure to a greater degree. If economic management once again carries out intervention in enterprise organization, then, *in determining the framework for the enterprises, the creation of the organizational conditions for competition must be given special attention.* At the same time, the experiences of decentralization between 1980-1985 warn us that it is only worthwhile undertaking the conflicts which are necessarily sharpened by the changes of organization, if other measures taken by the government do not oppose the desired favourable effects.

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THE CHANGING ROLE OF CO-OPERATIVES IN HUNGARIAN INDUSTRY

KRISZTINA PENYIGEY

In Hungarian industry, for a long time co-operatives¹ were a substitute for small firms. This contributed to the rise of their importance, although their share within production and employment remained - in international comparison - relatively small.

Changes in the Organizational Structure of Industrial Co-Operatives

Until the beginning of the eighties, changes in the structure of the industrial co-operative sector were largely biased: in the smaller size categories no new co-operatives were founded; in fact, the opposite happened: their number and share gradually decreased in the course of the centralization and merger campaign that followed the halting of the 1968 reform (see *Table 1*).

As a result of the policy change of the early eighties the legal framework covering small-scale ventures was substantially enlarged, and this resulted in a radical turnaround among industrial co-operatives too. By establishing a new organizational form, the small co-operative,² the number of industrial co-operatives with less than 100 members was increased rapidly. Their share in the total number of co-operatives rose to 52.3 per cent in 1986 and, in the same year, they represented 14 per cent of the total membership of such co-operatives. However, this spec-

1 Up until the eighties, beside industrial co-operatives the small firm sector was constituted by restricted private small-scale enterprises and by industrial plants established by agricultural co-operatives. The industrial plants of agricultural co-operatives were based on existing production capacities and workforces, as well as market niches left unaccounted for by large-scale state industry with their revenue. They contributed significantly to covering the losses of agricultural production. However, in many cases income redistribution by the mother institution has hindered the development of these small industrial plants. Therefore, they have only limited possibilities for accumulation, technical development and growth.

2 Small co-operatives are economic units based on the personal and capital contributions of members. They belong to the co-operative property form and function as self-governing legal entities. Their membership ranges from 15 to 100 persons. They may employ, besides members, a certain number of employees. They are interested in gross income.

tacular development only restituted proportions characteristic for the early seventies (see Table 1).

There were two sources of this increase in the number of industrial small co-operative (their number attained 778 in the third quarter of 1987). For one thing, a number of traditional small-scale industrial co-operatives³ decided to transform themselves into small co-operatives. The inducement was strong, because the gross income regulations applying to the small co-operative guaranteed much more autonomy than the detailed regulatory system and multi-channel income centralization employed with respect to traditional industrial co-operative (as with any state firm). The growth of the importance of the small co-operative form - a tendency which continues today - had another cause too - namely, that small ventures which had no legal entity were burdened by prohibitive taxes.⁴ As a result, many

Table 1

The number and membership distribution of industrial co-operatives according to size categories

Year		manual workers employed					Total
		-50	51-100	101-300	301-500	501-	
1971	number	137	252	352	67	3	833
	share of employees (%)	3.2	15.0	47.0	19.5	15.3	100.0
1980	number	15	79	370	125	72	661
	share of employees (%)	0.3	3.2	36.3	25.3	34.9	100.0
1986	number	336	213	375	101	52	1107
	share of employees (%)	4.5	9.6	39.8	22.4	23.7	100.0

Source: Statistical Yearbooks, Central Statistical Office of Hungary.

business work partnerships chose, and still choose, the small co-operative form. This process of movement towards more advantageous organizational forms calls our attention to the absurd situation that, with the status and opportunities of the different organizational forms being different, the competition on the market is in fact the competition of different organizational forms and not the real performance of individual organizations. The number of small co-operatives is also enlarged by small private ventures which have no other institutional forms to choose from should they grow beyond a certain size. However, real institutional-legal alternatives better adapted to the activity of small firms may be introduced by the new partnership law, which at the time of writing is in its drafting stage.

3 Among large-scale traditional industrial co-operatives, it sometimes happens that they reduce their membership to 100 or give autonomy to their smaller units in order to be able to convert themselves into small co-operatives.

4 In 1985 a 10 per cent and in 1986 a 20 per cent special tax was levied on those state and co-operative firms which put out some work to small ventures not having a legal entity (enterprise business work partnerships /VGMMs/, business work partnerships /GMKs/, specialized groups).

In the industrial co-operative sector, the centralization of the organizational structure could be halted without a decentralization campaign initiated from above⁵ simply by introducing a new organizational form, which would guarantee more autonomy. This favourable change could come about without recourse to government help, or additional financial assistance. In saying this, we do not deny that the activity of recently established small co-operatives would be more progressive in structure, if the capital-intensive, export-oriented, innovative organizations were assisted by normative allowances and credit.

General Problems in the Co-Operative Sector in Industry

Industrial co-operatives were in an unfavourable position against larger producers in the areas of material and import procurement, finances, output realization and market information. This is due to their smaller size and, partly to their property form. Such disadvantages as are discernable in the small firm sectors of developed industrial countries are, in the Hungarian case, much more pronounced. This is because of the deficiencies of the organizational structure, the demand overhang and the lack of institutional means and solutions which would diminish the competitive disadvantage of small firms by improving their bargaining position. As a result, they cannot fully utilize their capacity for market expansion and the special advantages they have due to their small size. The number of industrial co-operatives that contribute to the improvement of the foreign trade balance is small. To ascertain the role of small- and medium-sized industrial firms in export trade I analysed the 1985 export performance of 854 industrial co-operatives with workforces of under 500. 81.1 per cent of the industrial co-operatives with workforces of under 500 *do not export at all*. With another 8 per cent the export share is very low and does not attain 5 per cent of net revenue. *With non-rouble exports, a policy priority in Hungary, the picture is even less satisfactory: 84 per cent of industrial co-operatives with workforces of under 500 have no convertible exports at all; with 10 per cent the share of non-rouble exports within total revenue is less than 5 per cent. Only 7 out of the 854 industrial co-operatives analysed had a non-rouble export share above 33 per cent.*

In contrast with international tendencies the *division of labour* between industrial co-operatives of the small venture sector and large-scale industry is weak: in 1987 only 28 per cent of the total output of industrial co-operatives was directed towards industry. However, the establishment of small co-operatives has resulted in a positive change in this area because 48 per cent of the output of these organizations requires further processing. On the domestic market, small and large firms do not compete in general - in fact, they tend to co-operate. In those partial markets where competition has a role, the different types of small venture (enterprise business work partnership, business work partnership, small co-operatives, specialised groups etc.) compete for secure, large volume state enterprise orders.

At the moment, many administrative regulations hinder the *spontaneous growth* of viable small businesses. Reluctance to invest, a characteristic of private small co-operatives, reflects uncertainties concerning the political situation and economic policy, the lack of long-term legal guarantees, constantly changing regulators, and the instability of the economic environment due to ever more exacting taxation. Under such circumstances small co-operatives are not interested in increasing their

⁵ Centrally-decided decentralization of state industry is dealt with in papers by E. Bagó and M. Móra.

capital, and thus they follow short-term objectives instead. In the absence of guarantees, business ventures are perceived by the small businesses, as short-term activities. Only a small group of industrial co-operatives has the advanced technical knowledge necessary for high level innovation.

From Traditional Co-Operatives to Small Co-Operatives

As a result of the organizational and regulatory changes of the last two decades, and rearrangements in the breakdown of co-operatives according to property forms, the industrial organizations, which are today called co-operatives do not constitute a homogeneous group. At one end of the spectrum we find co-operatives which resemble state firms and on the other we find small co-operatives very much like private small-scale organizations. Our analysis revealed three basic types among industrial co-operatives; these differ considerably among themselves according to the behaviour of firms towards incentives, and the motivation and attitude of the membership. Thus we can identify: 1. traditional industrial co-operatives; 2. small co-operatives transformed or split from traditional industrial co-operatives; 3. small co-operatives newly established by private initiative or created out of a private venture.

In 1987, 450 industrial co-operatives - one third of the total - were run according to the traditional practices. As a result of policy steps directed against their co-operative character, and also as a result of the organic development which had occurred through the decades, *traditional co-operatives* have come closer to state firms. Therefore their co-operative traits, and the special favours arising from them, have gradually been worn away. Three decades ago, in line with the logic of the then prevailing regulation, a considerable number of proprietary decision-making rights and opportunities were transferred to higher levels. External regulatory bodies, raised hierarchically over industrial co-operatives, exercised property rights concerning the shaping of the activity and organization of co-operatives, the election of their managers, investment, income distribution etc. In this period industrial co-operatives became similar, as regards their freedom of decision and operational environment, to state firms controlled through compulsory commands. Although the co-operative reform concept of the late sixties envisaged greater firm-level autonomy, in fact giving back property rights to individual organizations, restraining the official role of previous regulatory bodies and the halting of the reform made complete realization of these ideas impossible. In line with changes in the economy at large, the interference of higher regulatory bodies was also reduced in the co-operative sector. Yet, although plan directives were abolished, the strong dependence of co-operatives on central and local government bodies remained. The conditions necessary for the autonomous operation of the traditional industrial co-operatives were missing in the same way as they were in the government sector. The sphere of autonomy was reduced by a strict, multichannel system of income centralization. This operated in the co-operative sector very much like in state industry. Beside heavy profit centralization, the outflow of personal incomes was constrained by a distinct wage regulation system.

Partly as a result of mergers instigated by outside bodies, and partly as a result of organic development, the division of labour in traditional industrial co-operatives became more complicated, and their inside organization became more departmentalized and more hierarchical. Intra-firm relations became less relevant for co-operative members, and the relationship between performance and income less direct. Members had fewer opportunities for participating in a genuine way in the management of the co-operative's capital and in the making of economic decisions.

This had an important effect on co-operative self-government which could not - above a certain firm size - function in the old way. The few proprietary decisions which remained with the co-operative moved out of the hands of the membership and became the prerogative of a separate managerial group. As for their intra-firm relations, industrial co-operatives became very much like hierarchical state firms, managed by appointed officers.

In the course of their several decades-long functioning, considerable wealth has been amassed by traditional industrial co-operatives. Within the individual co-operative's capital, indivisible co-operative capital - independent of the membership and very much like state property - became preponderant over members' property. In 1986 only 1.3 per cent of the wealth of traditional industrial co-operatives was divisible members' property. The members' compulsory contribution, degraded to the status of an 'entrance fee', and having hardly any effect on the functioning of the co-operative, cannot secure the members' adherence in the long run. The members' status is more that of an employee than that of a proprietor. Accordingly, members are primarily interested in the short-term increase of personal income. Instead of increasing capital in the interests of the long-term development of the co-operative, they try to consume the largest possible part of after-tax profit, i.e. they are no more interested in capital investment than the employees of state firms.

Small co-operatives *formed from traditional co-operatives* represent 20 per cent of the industrial co-operatives. To this group belong mainly larger sized small co-operatives with memberships of between 70 and 100. The transformation to the small co-operative form was motivated by the less strict income regulation of the latter. Single-channel gross income regulation secures much more autonomy in the utilization of income for this type of co-operative. The main appeal for this form was that it enabled the co-operative to escape from the strict rules of wage regulation because, in this way, personal incomes could be increased and the outflow of workers, e.g. from light industry - halted. As a result of gross income regulation material incentives became more effective. This was because the gross income regulation left more room for such incentive systems whereby wages and salaries are differentiated according to individual performance. In traditional co-operatives this was less of a possibility because the outflow of wages was much more limited. Therefore in this way, a more direct relation between performance and income has been established. Among small co-operatives the main endeavour now is to introduce the piece-rate system and adapt incentive systems appropriate to the character of the activity.

Reinforcement of material incentives and higher incomes (which are better reflections of performance) undoubtedly increased the adherence of memberships to their respective co-operatives, but in the proprietary attitude of members there has been no change. Membership is invariably based on employee status and not on proprietary adherence to the co-operative. Derived from their positions as employees, members are primarily interested in the short-term maximization of their incomes, and their interest in increasing common property is only indirect and very weak.

Considering all the small co-operatives together, these particular organizations are the ones which are supplied with the most capital because they accumulated considerable wealth during their earlier period of operation. Similar to traditional industrial co-operatives, the preponderant part of their wealth is invisible, despite the recent prescription - a necessary precondition of the transformation - that the members' contribution to the common wealth be raised to two months' wages. Due to the low level of members' property and the dividend paid on it (the dividend payable is restricted by several legal norms), it is almost impossible to secure the motivation and proprietary adherence of members. There has been no discernible effort among leaders of those small co-operatives formed from traditional ones to

increase members' property. On the contrary: in order to avoid possible conflicts within the co-operative they try to play down and eliminate differences between employee and membership status.

The example given above, i.e. of co-operatives formed from traditional organizations, clearly shows that greater freedom of decision in the distribution of income produced does not immediately establish a proprietary attitude in members. Also, lacking a share in the property, they cannot be called proprietors. Thus the basic preconditions of a proprietor's position still have to be created.

This group of small co-operatives is characterized by a simpler, more open intra-firm organization and more direct work relations, unlike the traditional industrial co-operatives. Some of them modernized (parallel with the change of their legal form) their intra-firm organizational structure. However, most of them preserved an old, somewhat clumsy form of self-government, as well as maintaining the old regulatory solutions. Decisions concerning the management of capital are invariably concentrated in the hands of a small managerial group, which in any case acts like an employer. The size of these small firms makes it possible to establish a simple organizational set-up, which is propitious for rapid decision-making and market adaptation.

The transformation into small co-operative had no inherent market and financial risk for the older organizations. Anyway, risk-taking is not a characteristic of their managements. It is primarily their size that explains their relative flexibility within the constraints of domestic market conditions.

More than 40 per cent of industrial co-operatives have originated from *small co-operatives established by private initiative*. The number of such organizations is increasing dynamically even today. Their membership usually totals less than 50. They do not want to raise the membership above that level because in an organization of more than 50-60 the management is easier to recognize and the financial risk is relatively high. There are, of course, some exceptions.

Small co-operatives are, invariably, not well supplied with capital. Therefore they give preference to contractual processing (needing no material) to services and to other intellectual activities. As initial starting capital is secured by collecting members contributions, and no other source of capital is at their disposal, they cannot embark on capital-intensive activities. Fundamental changes in this respect can be expected only if, in the period of a small co-operatives foundation and run-up to production, additional capital is at its disposal - beyond that initially invested by the members. It may take the form of start-up credit (a widespread international practice) or the mobilization of other 'non-member' capital. Despite their low capital provision, the small co-operatives have a significant role to play in technically progressive activities. Small co-operatives have a leading role in computer-based organization, in engineering services and in computer hardware production: they hold a 60 per cent share in the domestic market of professional personal computers. Their role is increasing in software export too.

By founding a small co-operative members take on a considerable financial risk. We cannot speak of market risk because they seek gaps in the market where shortage prevails and they do not have to reckon with genuine market competition. As sole producers of a product, or as a result of surplus demand, they are often in a monopoly position. Generally, the limited number of small ventures upgrades them and gives them a prominent market position.

Those small co-operatives which have recently been founded by private initiative, have faced great economic constraints, in that their situation makes them financially vulnerable. An important element of their business strategy is to preserve financial balance. A weak financial position may harm their market flexibility, their adaptation and their room for manoeuvre.

In such small co-operatives the capital contribution of members secures the ne-

cessary start-up capital,⁶ so the preponderant part of the wealth of the co-operative is divisible. As a result of the members high share in the co-operative's capital, members feel the co-operative is theirs, and thus they manage it not as simple operators but as true proprietors. Stronger material responsibility and financial risk (members are liable - with all their income beyond a certain limit, as well as with their capital contribution - towards the debt of the co-operative) means there is a strong motivation for efficient management.

Members' interest in the efficient management of capital means, first of all, the preservation and sensible investment of the co-operative's capital. However, until the small co-operative's financial situation is stabilized there is a strong interest to raise new capital, because this way they can liberate themselves from complete dependence on buyers, and thus they can stabilize themselves. Later, when the financial position has been stabilized, the raising of capital loses some of its importance. The instability of economic policy, uncertainties in judgement, discrimination in certain areas and the fact that market risk of investment is not commensurate with surplus income all contribute to this situation. In order to reaffirm the redeployment of private capital for production goals, so that long-range growth programmes can develop, legal guarantees and stable regulations are needed.

From among the three groups of industrial co-operatives, proprietary attitudes and interests are most obvious in those small co-operatives, which were originally based on private initiatives. The proprietary and employee sides of membership are not separated from one another and proprietary status exerts a strong influence on members' behaviour. This is in connection with the fact that members may directly act out their proprietary rights. External bodies do not draw the rights of management, capital operation, and workforce utilization away from the membership. Members have a great say in decisions, and thus a small group of managers cannot dominate them. The membership, composed of business-like people, can and does make the best of its proprietary rights.

Among newly formed small co-operatives there has been no attempt to maintain the traditional hierarchical management structure. Their intra-firm organization lacks articulation and clear, hierarchic super- and subordination. Within the organization, it is co-ordination that prevails. The relationship between membership and management is direct - in most cases personal. In small co-operatives there are possibilities for autonomous work and for the realization of individual ideas. Due to the openness of the organization and the directness of relations, the individual may follow every decision and its results. They are not only participants, but also active in the creation and development of processes. Co-operation is realized not only in the work process but also in management. The chairman's role is not that important in the management of the small co-operative and more stress is laid on the activity of the membership, this activity being based on self-interest. Decisions are mainly of a collective nature. In smaller co-operatives no form of elected self-government functions, and the membership exerts proprietary management directly through the general assembly.

Consistent application of the performance principle entices members towards economizing on wage costs and towards higher-than-average production performances. The freedom in income distribution makes it possible for the members of the co-operative to enjoy directly the fruits of a more flexible market economy.

Entrepreneurship and private initiative gains ground in these small co-operatives. Important characteristics of their behaviour include strong market orientation, flexibility and rapid adaptation. In the background of this situation stand specific

⁶ Members contribute to the capital of the small co-operative with an amount which is above the obligatory two months' salary. They buy shares voluntarily and make available the means of production.

property relations and, equally important, the small size of the organization, and its hard budget constraint. Yet the survival of these factors depends on market performance. The few detrimental effects and tendencies discernible in their activity (shunning competition, non-market competition, low interest in accumulation) stems from the general contradictions of the economic-market environment.

The question which arises concerns changes within the co-operative forms of property - namely, whether co-operatives imitating state firms can be considered co-operatives at all. Is there a possibility to strengthen the co-operative character of traditional industrial co-operatives and thereby to reshape these organizations? In the case of privately initiated small co-operatives, which conform best to the criteria of a model co-operative, a dubious development is the lack of interest in the accumulation of common co-operative funds.

**PRODUCT RANGE, MATERIAL COMSUMPTION AND
THE LACK OF COMPETITIVENESS
(A SURVEY OF HUNGARIAN INDUSTRY)**

GÁBOR HOVÁNYI

The crucial issue for the Hungarian economy and, included within it, Hungarian industry, is how to increase its international competitiveness considerably; without this it is impossible to halt the further decline of both economic growth and living standards.

A palpable measure of the competitiveness of industry can be estimated by assessing the competitiveness of individual products, the most complex indicators of which are the quantity of such products sold on the world market and also their prices. The international competitiveness of products, however, also has several other specific parameters. One such particular indicator is the material content of products. When this parameter of Hungarian industrial products - taken as an industrial average - is compared to the material content of foreign products which are successful on the world market, it is evident that Hungarian products (above all those of the machine industry) are heavier by some 30 per cent, i.e. they contain much more material. With this, not only the ratio of the cost of materials increases within the prime costs of products, but there is also a marked increase in the costs of transport, storage, repair, in the overhead expenses and the like.

One way of enhancing the international competitiveness of Hungarian industry, and within this that of its products, is to lessen the material content of the individual products; in other words: a more economical material consumption in product development, engineering, manufacturing and in the whole system of related processes. An investigation carried out during 1986 and 1987 by the Research Institute of Industrial Economics of the Hungarian Academy of Sciences¹ tried to discover the interconnections of product structure, material consumption and competitiveness in industrial companies in Hungary. The investigation also tried to point out the possibilities for material-saving and the related incentives already prevailing in these organizations.

This survey was based on the integration of several methods: it started out from the statistical data-base of the national economy; this was followed by the analysis of data from the balance statements of companies. Accompanying this was a survey based on questionnaires. This covered 50 industrial companies (the companies

¹ "Az anyagtakarékos tervezést, gyártást és felhasználást ösztönző gazdasági feltételek és eszközök a magyar iparban" /Economic conditions and means leading to material-saving designs, manufactures and usage in Hungarian industry/.

involved encompassed all the sub-branches of industry) and was complemented by interviews with experts responsible for the material management of companies. In some cases the process analysis of the material flow was also carried out. It follows from the method of this survey that some of the data refer to facts, while others reflect certain value-judgements. Although both types of data may equally impede the efforts to save materials, it is still practical to distinguish them. Therefore, in this summary report, after each paragraph that contains certain statements of major importance the sign (f) for facts, and the sign (o) for opinion are used depending whether the paragraph refers to fact(s) or to a judgement.

The major results and findings of this investigation will be summed up on the following pages.

Product Range and Competitiveness

The break-down of the product range of Hungarian industry according to main relations in 1986, unambiguously demonstrates that the open economy is not accompanied by an industrial structure open to competitive markets. Not more than 11 per cent of industrial products get through to the exacting foreign competitive markets, while 85 per cent is sold in markets characterized by 'hothouse protection', which bear both major and minor traits of unreality. (Protection manifests itself in lower quality-requirements, in prices which overestimate actual performance, in over-extended terms of delivery, and so forth.) Recently, due to non-rouble-related exports, which are often supported forcibly and irrationally, the really competitive products have not even reached the ratio of 11 per cent. This not only characterizes the international competitiveness of industry but also casts light upon its schizophrenic depths: namely, it is virtually impossible to work according to the stiff requirements of foreign competitive markets in one-tenth of production, while in nine-tenth work is going on within the tolerant atmosphere of 'hot-house markets' (f).

In the course of interviews with company personnel, it was repeatedly emphasized that, due to the effects of various restrictions or types of support, judging international competitiveness on the basis of results achieved by the companies had become an increasingly uncertain venture. However, there are several reasons for the undoubtedly low level of competitiveness: backwardness in technology, gaps in knowledge related to specific markets, the low availability of highly-skilled, disciplined labour, deficiencies ('loosenesses') in organization and management, blunders in regulating incomes and wages within the company, distortions in the social value-system, and indeed many others. All these are imbedded in the fact that the companies are not interested - in the long run - in competitive exports: such a task is not regarded as a strategic objective but as a short-term effort - a sort of a fire-fighting, performed in order to balance the national economy. Thus the strategy of maintaining economical material consumption - which is strongly correlated to competitiveness and is formulated precisely under its pressure - also gets lost (f).

The examination of long-term competitiveness relative to the product range focuses attention on significant shortcomings in the judgement formulated by companies. Companies tend to regard 19.2 per cent of their marketed products as competitive, in the long run, in the competitive markets; only 9.8 per cent is seen as being competitive in the short term. The ratio of their strategic products is reported as being around 47.9 per cent. Such products are regarded as being strategic and marketable in the long run too - yet they are not marketable in the competitive markets. Thus they regard almost half of their products as strategic

ones, despite the fact that they are no longer sold on competitive markets! Another contradiction is that the ratio of products seen as being strategic in the competitive markets is reported to be around 19.2 per cent; however, at present not more than 11.0 per cent of the marketed products are sold on the same markets. It appears from all this that the companies tend to judge the international competitiveness of their product structure more optimistically than is indicated by the realities. Hence it follows that the same attitude may apply to their estimation of uneconomical material consumption (o).

Product Range and Material-Intensiveness

What has been stated above is also proven by a similar optimism which the companies showed during the analysis of product range with reference to material-intensiveness. In the opinion of the companies, in the case of 42.0 per cent of their sold products the economic efficiency of material consumption is identical with that of successful products in the competitive markets - in fact, in the case of 15.2 per cent of their products they believe it is even better. They think that material consumption is markedly worse than that of successful products in the competitive markets in the case of only one-fifth of their products (o). In contrast, it is widely known that several products of Hungarian industry are 30, sometimes even 40 per cent heavier than the parallel competitive products, and the qualitative deficiencies of the basic materials used often add to the uneconomical nature of material consumption (f).

Interviews conducted in relation to this matter also proved that comparisons of material-intensiveness are rarely based upon palpable factual information. (The companies primarily compare the performance-related parameters of their products with those of competing products, while a comparison of the input - expenditure - elements is strongly eclipsed.) However, even if such information is available, the companies do not evaluate material-intensiveness and quality jointly, as a unity. Also, they do not assess the performance and operation (in other fields the utilization) of products made from a given material, and nor do they account for the total expenditure and returns with regard to all the material components (f).

The joint evaluation of material-intensiveness and profitability indicates that - according to the companies - almost one-third of Hungarian-made products (manufactured with a better, or at least nearly identical material consumption than that of the successful products of the competitive markets) belong to a group of products that may be sold with a better than, or at a level which is equal to average profitability (within 15.0 per cent: 4.9 per cent and within 48.0 per cent: 12.6 per cent, respectively). This points to a certain correlation between material consumption and profitability. It turned out, however, that more than one-third of the Hungarian products which were believed to have been manufactured with a better or at least nearly identical material consumption to that of the successful products of the competitive markets, could only be sold with losses or with state support or even not at all on the competitive markets (within 15 per cent: 10.3, within 42.0: 29.4 per cent, respectively). Considering the responses given to this 'cross-examination' of the survey, two characteristic features may be formulated: the economical efficiency of material consumption is not judged realistically by the companies, and it seems that several factors (e.g. prices, marketing, central regulations) considerably slacken the correlation between material saving and profitability. The interviews provided evidence of the simultaneous effect of both characteristics (f).

Effects of the New Product Range on Material Saving

In recent years the rate of material saving in Hungarian goods produced for sale on international competitive markets has slowed down. The companies tend to reckon with an annual average increase of around 0.59 per cent for the value of material saving. In contrast, if there were optimum conditions, both external and internal, for material saving the value of material saving could be almost doubled, i.e. in the opinion of the companies it would rise to an annual average of 1.0 per cent (o). (Yet, in this case, the average saving of 4.0 per cent planned for the starting-year 1987 is inexplicable.) Thus the phenomena of shortage would disappear, the necessary investments and technological developments could be implemented, and opportunities would arise to import the items needed for modernizing the product range. However, the double increase mentioned above is next to nothing: particularly if one considers that a good quantity of Hungarian products are manufactured with a 30 to 40 per cent larger specific content of material than the corresponding successful products in the competitive markets. The quantitative objectives of material saving, then, reckon with the survival of the present conditions and practices, and simply take no notice of the current requirements of competitiveness (f).

Some Forecasts Regarding Market Consequences

Achieving the objectives of material saving involves certain market consequences as well. Company estimations concerning the structural changes of the purchasing and selling markets are summed up in the following data:

a) *percentage distribution of the purchasing markets*

	at present	in the case of a new product range
- domestic market	57.5	52.6
- rouble-related markets	9.2	11.3
- markets of non-rouble-related advanced industrial countries	31.1	32.7
- markets of other non-rouble related countries	2.2	3.4
Total	100.0	100.0

b) *percentage distribution of selling markets*

- domestic market	73.6	65.9
- rouble-related markets	13.2	14.1
- markets of non-rouble related advanced industrial countries	11.0	15.6
- markets of other non-rouble related countries	2.2	4.4
Total	100.0	100.0

As is clear from the company forecasts, no such breakthrough can be expected to take place in the market structure that might correspond to the breakthrough necessary for developing really competitive products - i.e. a breakthrough which could eliminate the surplus of 30 to 40 per cent of the specific content of materials, that characterizes several fields of industry. (It must also be mentioned that the companies are not in fact planning such a breakthrough in material saving /o/).

In the critical commercial relation, i.e. in the competitive markets of the advanced industrial countries, the imports by companies would rise from 31.1 per cent to 32.7 per cent while their exports would rise from 11.0 per cent to 15.6 per cent. Even if the export volume increased by 4.6 percentage points it would still fall short of being able to meet the import demand in the same relation (although the latter would increase by 1.6 percentage points): 'exportability' would be only half of 'importability', i.e. half of the industry's convertible imports should really be produced by some other branches of the national economy. The 'hothouse protection' of industrial companies in the sales markets would decrease from the present value of 86.8 per cent to only 80 per cent - provided that the conditions of the rouble-related external markets were not tightened up. This overall picture does not suggest that Hungarian industry - at least according to company conceptions - will contribute adequately to improving and maintaining the country's international balance of payments in the future, nor is there any sign that it will lay foundations for it by applying a material saving drive sufficient for achieving some form of breakthrough (o).

Discussions with experts in companies also confirmed that the market forecasts by companies tend to rely upon very poor information and start out from the given company's actual capabilities rather than from the opportunities and requirements of the markets. Companies do not perceive - with all its implications and weight - the connection that exists between rational material consumption and the marketability of products. Nor do they size up the extent of the breakthrough which is necessary in material saving and in other fields of company resource management in order to improve the international competitive position of the national economy and to enable the economy itself to grow at an acceptable rate. Finally, companies do not have elaborate and well-tried methods with which they can size up and develop the marketability of their new products and their product range in the process of modernization. Nor do they have any means of formulating their potential market objectives and organizing all the technological, economic and marketing tasks necessary to achieve this end. Without all this, however, the returns of a comprehensive transformation of the product range is almost impossible to size up (f).

Conditions Necessary for a More Material Saving Product Range

According to opinions held by the company experts, *the most important conditions which need to be created by the top economic management, and which would effect the shaping of a more material saving product range are as follows* (here and henceforward the ratings range from 10, being maximum significance, down to 0, which is of no significance):

- | | |
|--|-----|
| - lifting the import restrictions | 8.0 |
| - stronger interest at company level in improving technological and economic conditions; at the individual level, the introduction of incentives which are proportional to performance | 7.8 |
| - simultaneous increase of cost-responsiveness and result-interest within the company | 7.5 |

- enhancing the unity and stability of the content of economic regulations 7.4
- the intensification of market-effects in the whole of economy 7.2

What the ranking shows is the momentary pressure of import restrictions which often come close to jeopardizing the existence of companies; the conditions following on the first are identical with the possibilities for long-term evolution. With regard to the unity of regulations, the company experts pointed out that in cases where there is an increase of certain kinds of costs (taxes, expenditures on social security, interest, etc.), the ratio of material used will decrease, even if the production value and the natural material consumption remains unchanged. Such a change of regulations, then, will not urge on material savings since it makes the savings probable from the aspect of accounting, despite the fact that the savings have naturally not come about. It is also noteworthy that the elaboration of a wage system which explicitly urges material saving - which was first proposed by some companies among the 'other conditions' and was then considered by others too - has been ranked rather low, with a rating of 5.8. This shows that they do not find it proper to use the wage system exclusively to urge on material saving; in fact, they prefer to use it to increase individual performance in general. Finally, it is of some interest that the 'honour' of central economic planning among the companies had been somewhat eroded: its significance was rated at 4.5 (o).

Of the general economic and social conditions the most important were rated as follows:

- elimination or forcible relegation to the background of shortage phenomena 8.2
- creation of a demand market by, among other things, eliminating monopolistic positions 8.2
- strengthening labour discipline, restoring the importance of quality and performance, and renewing the related order of social values 7.7
- developing a greater 'expenditure-responsiveness' at the social level 7.7
- considerable strengthening of discipline with regard to deliveries (prompt completion of undertakings) at all social levels 6.8

In this particular field of problems there was no significant variance among the companies which could serve to underline any one of these questions.

In the interviews special emphasis was laid by the experts on the fundamental social conditions underlying the actual and 'palpable' problems emerging within the companies. Three topics were generally stressed:

- the problem of the order of social values, which in recent years has relegated not only performance and quality from their proper rank but also lowered the 'returns' of intellectual work;
- the importance of individual erudition, and within this and in addition to high-level professional training, the significance of the role of the general level of culture and education in value-creating economic activities;
- finally, the weakening of such essential constitutional characteristics as a sense of duty, responsibility and identification with the endeavours of companies or working collectives as a whole (o).

The Means Available to Companies for Developing a More Material Saving Product Range

Taking stock of the means available to companies for shaping up a more material saving product range, it was found that in the first instance information had to be gathered on some questions regarding decision-making. In the opinion of experts, the individual intra-company organizations participate in the preparatory work on decisions related to the transformation of the product range in the following order of weight, taking the participation of all organizations as 100: discovering the market opportunities for marketing work: 26.5; R&D activities by transmitting technological trends and by their own R&D proposals: 24.7; production by enforcing the company's own possibilities: 16.8; supplying materials and component parts by giving information on the related restrictions: 11.2; the company's financial management by outlining the investment possibilities and the tasks of liquidation: 9.2; the company's planning activity by economic analyses and formulating strategic aspects: 7.9; other company organizations: 3.9; and, finally, external experts (who are not necessarily employed by the companies) represent a weight of some 0.6 per cent on the average of the examined 21 companies (o).

The interviews disclosed that the companies tend to have a better perception of technological trends (at least as regards the finished products, since in respect of the material consumption and the component parts they are less informed). However, their knowledge of market situations and opportunities - especially in respect of the external markets and the highly exacting competitive markets - is not comparable with, and does not even approximate to, that of their counterparts in the advanced countries. (It is quite another question whether, under the present conditions of production, the country could cope with known market opportunities or with a rapid change of the competitors' supplies.) (f)

In the companies' opinion (which was again rated on a scale giving 0 as minimum and 10 as a maximum), the motivation of experts for the comprehensive modernization of the present product range is at its highest in the case of the company's top-management (6.6). This is followed by, almost at the same level, the R&D staff and experts in experimental production and marketing (with rates of between 5.3 and 5.1). The lowest ratings were recorded for those engaged in personnel and manpower management (1.8) and in organization and financial management (2.4), i.e. the respective motivation of the development staff and experts in experimental production is somewhere in the 'midway', between the maximum and a complete lack of motivation. The motivation of experts responsible for the comprehensive transformation of the product range, for the introduction of new organizations and operational processes, and for the financial investments approaches the minimum (f).

As appears from the question concerning the modernization of the product range and the adoption of the new methods of product development and their technological solutions, half of the surveyed companies apply various methods of economic mathematics. Only one-third of the companies adopt new computer-aided methods (CAD, CAM, FMS). It is, however, a thought-provoking question to ask why they do not adopt other up-to-date methods which are less expensive than the former: e.g. value- and function analysis, life-span curve analysis, and the like. This refers partly to a deficiency in the way of thinking, partly to a lack of the information necessary for adopting these methods. The final conclusion that may be drawn from the questionnaires originated precisely from the 'open' nature of the questions posed: our companies know only a few novel methods and technological solutions; these solutions are internationally accepted and are aimed at the modernization of the product range. Even so - in addition to the parameters of the returns,

of the technological and market positions, and of the risks and inevitable changes of capacity - the parameters of a rational material consumption also play an important role (f).

Factors Impeding the Modernization of the Product Range

The question which asks *what technological or economic causes forced the companies to give up product development that promised good market results - and thus the change of their product range - is not heartening either.* (The way in which companies can forecast success on the market has already been evaluated.) According to responses to the questionnaires, the share of omitted product developments, as a percentage of all products manufactured in the previous five years, was 97.8 per cent, i.e. each second development was 'abortive' for particular technological and economic reasons. The most important economic effects (and their weight), also in terms of the percentage of returns from sales of products developed in the previous five years, were as follows:

- lack of capital for the necessary technological development	29.1
- low level of the existing technology, which then hinders further development	15.3
- poor quality of the available basic materials	12.7
- the obsolete technologies of cooperating organizations	7.8
- state-imposed restrictions on the imports needed for development	6.9
- the disorganized state of the complex development processes (R&D, engineering, manufacturing, marketing)	6.4

The experts added to this by mentioning that the foreign companies which are successful in the competitive market can ward off all these factors, since they may have an easier access to the capital necessary for developing, manufacturing, and marketing promising products than to their basic materials and components. It should also be taken into account that these companies finally put only one product (out of the 5 to 10 planned products) on the market. This they would have judged as being a promising possibility at the beginning of the development. For Hungarian companies this would involve a tenfold or even twentyfold deterioration of their chances (f).

The next task was to analyse *the internal (intra-company) causes that had prevented the industrial companies - in the previous five years - from stopping the manufacture of uneconomical products.* It turned out that all in all one-third of their loss-making products had to remain in production. The main reasons for this (and the weight of those reasons) - expressed again as a percentage of all short-fall returns from the unprofitable products which had not been manufactured in the previous five years - were the following:

- owing to the obsolescence of technology, no new, up-to-date product could be manufactured	17.3
- there was no other possibility for maintaining the production capacity	8.1
- there was no substitute to be found for the unprofitable, loss-making product	7.

- despite the losses, the companies succeeded in obtaining state subvention for the efficient sales in the capitalist markets 6.2
- the existing manpower structure did not permit the transformation of the product range 5.2

The rigidity of the product range originating from this group of causes reached its peak in the metallurgical branch (90 per cent), as well as in the synthetic material processing and furniture companies (65 per cent each). The least affected branches were the aluminium industry (15 per cent), the telecommunications and vacuum industries, and the silk industry (30 per cent each) (o).

Interviews with the related companies confirmed the impression that the greatest obstacle in the way of the innovation-type renewals - and thence of the comprehensive change of the whole product change - was the ever increasing obsolescence of technology. It seems, however, that there are other conditions for successful development, manufacturing and marketing: the low level of organization, deficiencies in marketing, the loosenesses of internal management systems and the like. It is, therefore, to be feared that even if there were a possibility for a large-scale modernization of technology sometime in the future, the product range could only reach a competitive level along with rational material consumption - yet it seems this can only be realized partly (f).

Cumulative Results of Material Savings within the Change of the Product Range

Taking the companies' material consumption in 1986 as 100 per cent the survey tried to find out what percentages of material savings (-) and surplus material consumption (+) would be possible, on a yearly average, if a new product developed in the previous five years were to be manufactured. Also the survey attempted to discover if there were in fact markets for newly generated product development ideas which had not been realized; in addition, the continued output of products which had become unprofitable was considered.

The average values for these factors are as follows:

- manufacture of new products developed in the previous five years -3.0 per cent
- ideas of product development which had not been realized +2.2 per cent
- continuing the manufacture of unprofitable products +3.7 per cent

Comparing these data with the value of material savings forecast for the period 1987 to 1990, i.e. to a yearly average of 3.0 per cent, the picture is not at all encouraging: for instance, the forecast material savings of 3.0 per cent in the case of new products is opposed to the present surplus material consumption of 3.7 per cent for the manufacture of unprofitable products. This situation can only be improved if the new product development ideas which have not been realized in the previous period are put into practice. Considering the situation in this context, it seems that speeding up the change of the product range will be a fundamental condition of attaining even the minimum objectives of material saving - not to speak of the extent of material saving which is indispensable for reaching international competitiveness (f).

Some Conclusions

A well-functioning economy, and within this the market, 'instinctively' react if demand rises above supply: prices rise, manufacturers increase their supply by making new investments, and new manufacturers appear to sell their goods on the market. If the demand exceeds the supply in the long run too, consumers will become more thrifty or, if possible, will gather reserve supplies. Should this happen, they will even buy products of inferior quality. Furthermore, the consumer may even attempt to bridge the gap between demand and supply by substituting one product for another.

The Hungarian economy, and within this the material supply of industry, are interwoven with the phenomena of shortage. Quite a few basic materials and component parts are available only occasionally, and even then their quality is inferior to what is required by the consumer - who anyway has to wait for slow deliveries. Of course, all this frequently helps to deteriorate, very significantly, the economic efficiency of production. Also, it endangers the sales of products and hinders the forceful modernization of the product range of the companies. The consequence is a worsening of the international competitiveness of both the products and manufacturers.

However, simultaneously with the above points, a considerable waste of materials also occurs in Hungarian industry. Products are far too heavy, spoilage reaches a high percentage in the production processes, the re-utilization of materials not used up in production is neglected, and due to the superfluously large material stocks, the quality of basic materials deteriorates. Therefore, shortage and waste appear at one and the same time - they follow from, and intensify each other.

The simultaneous existence of shortage and waste may be - in the final analysis - attributed to the fact that the 'instinctive' mechanisms of the economy hardly work at all. The primary reason for this should be looked for in the method of economic management, which tries to create short-term balances by artificial interventions, which then oust instinctive reactions. For example, one such intervention involves the low level of prices of materials, i.e. the 'soft' forint for materials, as against the 'hard' forint for wages and investments or for the system of regulating the material stock; the effect of this is the paralysis of the trade of the means of production. The second reason is directly related to the existence of apathy, which neither at the individual nor at the company level encourages the elimination of waste - i.e. on the part of demand. Nor does apathy help to urge people to take advantage of the opportunities offered by the shortage - i.e. on the part of supply. Finally, the third reason is the lack of capital. This impedes both procurements from those import markets which have a flexible supply, and also hinders the domestic investments needed to expand production or to carry out the flexible transformation of the product range and line of production.

It is evident from all this, that as long as the conditions of economic management, interest and capital supply cannot be simultaneously and significantly changed, there will be no real possibility to bring the companies' co-existing problems of shortage and waste to an end. Consequently, a considerable change of the product range cannot take place either. As a result the international competitiveness of the economy and industry cannot be improved to the extent necessary for keeping abreast with world-wide technological and economic development.

SOME CRITICAL ASPECTS OF MATERIALS MANAGEMENT IN HUNGARIAN ENTERPRISES

LÁSZLÓ CHERNENSZKY - IMRE NÉMETH - PÉTER SÁRKÁNY

The principal characteristics of the materials management of an average Hungarian industrial enterprise may be summarized as follows: the enterprise holds stocks of materials which cover its production tasks for two to three months, while the inventory of semi-finished and finished goods meets its needs for a few days.¹ Being at the mercy of their suppliers, who usually enjoy a monopoly position, they are thus deprived of the possibility of making alternative purchases. Therefore, the enterprise is usually unable to improve its position in relation to its suppliers. The squandering of materials is not a rare phenomenon, the products are mostly of an obsolete construction compared with the international level, and the quantity of materials used is high. As a result of these facts the efficiency of the use of materials by Hungarian industry must be qualified as being low.

It is - according to the traditional concept - the task of enterprise materials management to secure the materials needed for production at the appropriate time, at the right place, in the necessary quantity and quality, and with the optimum capital outlay and costs [6]. This approach regards materials management as an activity serving and subordinated to production; it is seen as an activity which, having been built into the production process, need not be regarded as a separate function. Against this traditional view, a concept of materials management (integrated logistics) has gained ever-widening acceptance in recent years in enterprise economic theory and in the practice of the market economies. According to this view, there is an increasing need, on the one hand, for a closer co-ordination and a uniform direction of the partial activities of materials management realized by the separate organizational units. On the other hand, in the interest of the most successful operation of the enterprise (as a logistic system), it is essential that considerations related to materials management should rise in the enterprise target system to the same level as considerations in the other functional fields [4, 10].

The practice of materials management in Hungarian enterprises can be regarded as traditional in the sense that considerations concerning the continuity of production play the primary role in most of them, while materials management performs an auxiliary task. A uniform, logistically oriented control of materials management

1 The material inventories already purchased but not yet used in production amount to 71-72 per cent of the stocks held by industrial enterprises; unfinished production accounts for 16-17 per cent, and finished products for 11-12 per cent. These proportions have been unchanged for about 20 years [3].

activities simply does not exist. At the same time, this traditional materials management system differs in many respects from that of the enterprises working under the conditions of a market economy. On the one hand, it has to cope, in the field of acquisitions, with problems that are not, or are less conspicuously apparent in the developed market economies. On the other hand, owing to the weakness of market competition, the compulsion that would stimulate the enterprises to pursue a fast utilization of their existing reserve materials is lacking, or is not strong enough.

Hungarian industrial enterprises acquire the materials for their production from three main sources - from domestic suppliers, from socialist suppliers, and from capitalist suppliers. The basic materials and components purchased in the domestic market or imported from capitalist or socialist countries usually show substantial differences in quality, reliability, delivery conditions (order size, price, delivery schedule, etc.) and in other services.

The possibility of purchasing in capitalist countries, which usually promise more favourable quality and delivery conditions, is not always given to the enterprises. This is especially true if a product of similar technical parameters can also be bought domestically, or from another socialist country. However, the quality level of the products that can be imported from a socialist country is determined by the 'hardness' and good quality of the products offered for exchange in bilateral trade. Therefore, these products are often of a poorer quality than the products available from capitalist sources. Domestic products can be acquired directly from the manufacturer, or in the wholesale or retail trade. Factory servicing is usually ensured for the largest purchasers, while those buying smaller quantities may turn to distributors who specialize in supplying a given group of companies of the wholesale trade. Those buying very small quantities may make their purchases from retailers. Thus the choice between production enterprises, wholesale traders and retail traders - none of whom offer substantial differences in price and delivery conditions - is not open to customers buying smaller quantities.

The indirect economic management introduced in 1968 did not significantly alleviate the reproduction of quantitative shortages and the purchasing problems, although enterprise independence increased in several respects. Thus enterprises were able to establish and widen their marketing and acquisition relations to certain extent. These advances were coupled with some easing of the administrative constraints on price setting. Nevertheless, state institutions responsible for product turnover and market supervision still play a significant role today in putting the brake on cost development and price rises. These institutions are entitled to decide on the justification and approval of price rises. Thus the final enterprise incomes are only partly established in the market. Their actual magnitude is also greatly influenced, along with price interventions, by general fiscal means (taxes, subsidies and the intricate, almost unsurveyable system of individual financial interventions). The large-scale central redistribution of enterprise profits does not always make it possible for enterprises to expand their production capacities and thus they cannot anticipate possible increased price revenues. In case of shortages, the enterprises do not always increase their production; certainly their development endeavours are not always aimed at putting an end to market shortages.

At the Research Institute of Industrial Economics of the Hungarian Academy of Sciences, research activities concerned with problems of materials management have been carried out since 1986. These have been within the framework of the research theme "Economic conditions in industry which stimulate material-saving planning, production and utilization". The present study discusses a few essential aspects of industrial enterprises on the basis of the results obtained in empirical research carried on in enterprises of the metallurgy, engineering and building industries. Of the activities involving materials management our paper mainly concerns those interrelationships which exert a decisive influence on enterprise inven-

ories and which are of a determining significance from the viewpoint of adjustment to supply and demand. It does not investigate the materials management aspects of the development of new products and the related consequences for inventories; rather, it is confined basically to the materials management activities related to current production. *Part 1* explains processes, certain major characteristics and the problems of the planning of material stocks, of acquisition, of production planning and inventory management. *Part 2* describes the characteristics of the quantity- and time-specific interrelations of the materials supply and inventory utilization of the enterprises. *Part 3* discusses the problems of resource evaluation and regulation which impede the significant rationalization of materials utilization. The study closes with a few concluding remarks.

1. The Process of Materials Management in the Practice of Hungarian Industrial Enterprises

Materials management, whether of the traditional type or the so-called integrated materials management, has to perform a large number of inter-connected activities built, to a certain extent, one upon the other. Although their organizational placement and the methods applied in their realization may significantly differ from one enterprise to another, the major activities of materials management are roughly identical.² The efficiency of the enterprise is influenced by the way in which the individual activities of materials management are realized, how these activities are tied to one another, and what the information flow is like within the enterprise. However, the efficiency and the methods applied are - the enterprise being an open system - also greatly dependent on the external environment.

As we have already mentioned in the introduction, *Part 1* is only concerned with a few activities of materials management in Hungarian industrial enterprises, along with some problems of the planning of materials requirement, of stock-building, of production planning and of inventory management. However, it appears to be expedient to say, by way of introduction, a few words about the organization of enterprise materials management.

In the practice of Hungarian industrial enterprises, part of the activities of materials supply is generally handled directly by the purchasing organization of the enterprise - namely, the *materials supply department*. This department performs a decisive part in domestic acquisition and in the quantitative control of materials. It also directs warehousing, manages the related transport and materials handling activities, occasionally performs the recording of materials, and takes care of part of the stock of materials. The other activities of materials management are tied to the organization of acquisition to a lesser extent. The direct responsibility of the materials supply department generally covers those materials whose utilization is relatively continuous (e.g. auxiliary materials, certain basic materials and sometimes fuels). Users within the enterprise need not report their demand for these materials to the materials supply department; the department decides on their use independently by taking into account the supply and inventory allocation laid down for them. The less continuously, but frequently used materials and components

2 A possible grouping of these basic activities is as follows: forecasting and market analysis, the activities of technical preparation, production planning and the programming related to materials management, supply, materials distribution system within the enterprise, inventory control, inventory evaluation, materials handling, transport and distribution.

- especially the more specific ones - must be claimed by the users themselves from the materials supply department. The department decides whether the existing inventory of the enterprise covers the demand, or whether it has to start a new acquisition process. The responsibility for the inventories of these materials is no longer born by the materials supply department, but by the respective factory units or by the functional organizations (e.g. the plant maintenance section).

In order to avoid excessive enterprise inventories, idle stocks, shortages of materials and the related production hitches and losses it is important for the operative inventory management and the acquisition department to know when and how exact information about the demand for materials will be made available to them.

One of first items of information about the *demand for materials* is furnished by the annual production plan. It contains, along with aggregate data, estimates concerning the material needs of the more important groups of materials used in larger volume and also envisaged and planned by the central economic management (e.g. for certain materials of ferrous metallurgy). The annual production plan is *usually divided into four equal temporal quarters* based on the orders previously placed, on long-term contracts, on demand surveys carried out in the case of larger buyers and on past data. Taking into account the forecasts of the plan and the utilization in earlier years, annual skeleton contracts are concluded with domestic producers and socialist suppliers regarding the delivery of certain basic materials and product groups. The system of skeleton contracts provides a form of security for the enterprises carrying on a more homogeneous production, and where the quantity and scheduling of materials utilization can be forecast more easily and more reliably for the long run.

In Hungarian industry, production for inventory purposes is relatively restricted, and manufacturing is mostly carried out according to orders. It is general domestic practice, especially in metallurgy and engineering, that *the suppliers acknowledge the orders only for quarterly deliveries*; that is, they recognize the first, second, third and fourth quarters as delivery times. The scheduling of delivery within a given quarter depends on the supplier; in addition, the supplier also reserves the right of preliminary delivery. All this means a certain *security* and a greater manoeuvrability for the deliverer. At the same time it keeps the buyer in *uncertainty*. For example, he has to place the order for the material needed for a given commodity to be manufactured in the 2nd month of the 4th quarter 4 months before the 3rd quarter - that is, about 5 months before production and 3 and a half months before the beginning of the quarter. This is in order to increase the probability that it will arrive. The detailed quarterly production programme based on orders is most unlikely to be ready at such an early date. This is either because no orders have yet arrived from the buyers, or because the technical preparation is still going on. The factory units, however, have to signal their need for materials to the purchaser - the materials supply department - at a time when the plant units are only partly informed about the production programme and about their concrete tasks. *The statement of the material needs for all these is based primarily on the utilization of previous periods (i.e. of quarters). Thus acquisition often greatly differs from concrete needs. It is an unavoidable consequence that superfluous materials are also ordered, while others are not, or at least not in the necessary quantity.*

When the quarterly *production programme* is drawn up, production management and the materials supply department examine whether the materials needed for production are in store, or their supply can be reckoned with in face of the orders already placed. On the basis of this investigation a so-called *list of wants* is compiled. In the knowledge of concrete demands the materials supply department has the task, on the one hand, of annulling or modifying superfluous orders. This is not always possible because it may occur that the material concerned has already arrived by that time. On the other hand, attempts must be made to secure the mate-

rials still missing according to the list of wants. Sometimes it is sufficient to urge delayed delivery. However, it is often necessary to place new orders because the quantity of the material in stock, or expected to arrive, is not sufficient. Yet, owing to the low finished-goods level and to the scarce supply of distributive enterprises, it cannot be guaranteed that the material for which the orders were placed will arrive in time, and that the product to be manufactured can be delivered by the time stipulated in the contract. Very often the partner enterprise is unable to fit such 'delayed' demands in its production programme. This is due to technical constraints, material shortages and other considerations. Sometimes, however, the supplier exercises goodwill towards the urgent demand of one of its more important buyers, and satisfies it even from the consignment manufactured to the order of another buyer; thus it is even occasionally ready to take responsibility for the delay and the infringement of another contract. In some cases, such decisions are taken not merely in the direct interest of the supplier, but because of the pressure of central economic management. This is especially the case if the buyer can prove with documents that, due to a lack of material, he is unable to perform a commission related to a priority of economic policy (e.g. an important export deal). In this case, the supplier often tries to obtain some advantage either from the buyer himself or, what is more typical, from economic management.

In securing materials needed for the production programme personal connections also have a role to play, but these are exclusively connections between the supplier and the buyer. It is a peculiar, but not infrequent form of securing materials that the materials supply department tries to 'hunt' for the badly needed material not from the manufacturer or trade, but from another user who happens to have it available as idle stock.

The availability of materials, their deliveries and shortages have to be cross-checked almost continuously between the materials supply department and production management. This is also the case in the course of short-time, daily programming. *The observance even of long-term supplies is not guaranteed in each case.* Moreover, it also occurs that the supplier delivers less than the quantity laid down in the contract, and quality complaints are also frequent. *The prompt settlement of complaints and the possibility of exchange are also limited by the inventory level of finished products.* However, even exchange does not always mean a solution, since some of the quality defects are connected with the quality of the materials used and with the outdated character of the manufacturing equipment and the level of technology. *These defects cannot be removed by legal sanctions or penalties.* Under the given circumstances, the work of the materials supply department is confined to such operative, fire-fighting activities as the urging of deliveries. It also has to make available, in one way or another, the materials needed;³ sometimes even the higher levels of enterprise management are compelled to interfere by exercising their authority to give emphasis to the importance of the demand for the given material. Not unlike materials supply, the activity of production management is also usually confined to the solution of daily problems. Therefore, *production takes place largely according to the availability and the actual delivery of the materials,* and does not always meet the buyers' deadline for deliveries.

The procurement conditions, the long waiting periods for supplies and the great uncertainty of delivery compel the enterprises to keep a high inventory level of materials. But along with the external circumstances, the regulation, the estab-

3 It must be noted that factors are also involved in this, such as following: In the decisions related to the acceptance of incoming orders and to the delivery times, the supplying date and the inventory level are not always taken into account. The opinions and proposals of the materials supply department are often ignored, or not accepted. However, such opinions are - primarily in the case of exports - important when references to market competition are taken into account.

lished order and the methods of *inventory management* within the enterprise also contribute to the fact that the economic consideration of minimizing inventories (material stocks) is pushed into the background.

Enterprise management includes in its annual plan an aggregate inventory level for the individual production and functional units. It is the enterprise inventory estimate that is broken down to inventory elements, to productive units and to inventory executives. The enterprise management can then 'size up' its target figures by a basic method (taking into account the utilization and idle stocks of the previous years and quarters) involving a series of bargainings within the enterprise. This is in such a way that the determined (desirable) enterprise inventory level should not be transgressed. *In setting the enterprise and factory-unit inventory levels it is invariably a basic principle that the inventory turnover, i.e. the ratio of the average stock level to material utilization, should not deteriorate; also, if possible it should improve to a minimum extent, as the level and development of stocks is an important criterion of the assessment of enterprises by central economic management.* Due to the fact that the representatives of economic and financial management are unable to qualify exactly the materials and inventory management of the individual enterprises, they usually compare their findings to earlier periods, or perhaps to other enterprises of a similar manufacturing profile.

It is, however, a serious problem of the development of an aggregate inventory level that reliance on the data of previous periods involves the assumption that materials management and, within it, inventory management fulfil their task optimally and thus no changes are necessary. In fact if market competition is weak, *a practice of wasting may also be pursued at the given inventory level and turnover; this, compared with earlier periods, may perpetuate the situation for years.*

It is another serious problem that rather rough methods are applied in the course of operative activities. There is usually a lack of feedback appropriate for making decisions about whether the stock levels set for the individual factory units are justified or not by the needs of production. *Individual norms set for the various materials and compulsory stock levels - which might be a kind of feedback - are rarely applied in stock regulation.* They are mostly used in enterprises carrying on homogeneous production and, more exactly, in the case of materials used continually, individual stock norms based on an analysis of the utilization and supply times applied in earlier periods are usually not set. Reliance is generally placed only on routine estimates; thus, for example, for the products from supply plants A and B 3 and 4 months of production time, respectively, can be reckoned with - this means that it is expedient to store a stock covering a production run of about 3 to 4 months. A somewhat better practice is applied elsewhere. A compulsory aggregate stock level and turnover time are used for several groups of materials (for example for fine and rough plates, unalloyed plates, etc.) and for so-called standardized products (for example steel plates). The sum of the stock levels of these standardized items corresponds to the stock level allocated to the enterprise or to the plant unit. In operative stock management, efforts are made to operate with the stocks of certain materials in such a way that the norm series does not transgress the aggregate forecasts for stock limits. This method provides a definite solution in the case of enterprises with a wide assortment of materials, but it is suitable only for the localization of glaring disproportions and for the perception of the abrupt stock changes of materials which constitute a significant share in stocks. Considering that the stock norms set by the individual groups of materials are also established by similar indicators from earlier periods, (and according to the rule "it should not become worse, but, if possible, it should become a bit better"), the critique exercised in the case of the aggregate stock level is justified here, too: this solution does not stimulate the individual productive units to explore possibilities for saving. *This group of materials, or the basis approach which often extends to the depth of the individual materials, also contributes to invariability, and to the constant reproduction of the asymmetry of enterprise stocks with regard to the*

above-mentioned distribution, i.e. the disproportion between the stocks of basic materials and finished products.

The range of methods applied in stock management is constrained, on the one hand, by the availability of the data which refer to material requirements. On the other hand, the applicable methods also depend on environmental and purchasing conditions.

The significant uncertainty of purchasing conditions, and the periodical and long waiting periods for supplies in stock management - as is the case with material needs - make it possible to apply only rough methods. With the given acquisition conditions, it is primarily the so-called "periodic stock control processes"⁴ that may be applied. In the case of periodic stock-control methods, the greater the uncertainty and the longer the supply period, the more advisable to keep a larger stock. However, if the length of the supply period and the size of the delivered quantity are also uncertain (which is a further factor increasing stock), and if, in addition, the expected materials utilization can be stated only with a degree of probability, then the expedient stock size cannot be determined other than by such expensive and/or intricate methods whose acceptable precision is either not worthwhile or is impossible to apply in practice.

In a significant number of Hungarian enterprises the many-sided dependence of the conditions of stock management on external environmental factors is indisputable. However, at the moment the external factors too often constitute a reference basis, and the enterprises do not always endeavour to make use of the possibilities for rationalization in the existing stock reserves and the related materials management.

2. Some Quantity and Time Relationships of Materials Acquisition, Materials Utilization and Stock-Building

In the course of our investigations we have analysed, on the basis of 4 metallurgical and 11 engineering enterprises,⁵ how the scope of the enterprise materials supply policy developed in the first half of the eighties, and how it influenced materials management and the size of the stocks of enterprises.

In our analysis we have first tried to find out the extent to which *the interrelated proportions of the main acquisition sources have changed*. Such an investigation is justified, along with the already mentioned differences of the individual main acquisition possibilities, primarily by the great difficulty in discovering the resultant pressures upon the enterprises. Such pressures, of course, come from different directions. Thus, among other things the various financial restrictions, such as the 'hardening' of the monetary environment compared to the previous state of affairs, are supposed to strengthen the sensitivity of the enterprises to the movement of costs and prices. At the same time the steadily increasing direct government interventions in commodity turnover, import economy and export stimulation are likely to retard the strengthening of the role of price signals.

On the basis of the data received from the enterprises it was possible to ascertain that *the ratios of the main procurement sources - and within them also the proportions of the concrete suppliers in general - showed a great stability in the majority of the enterprises in the period under review*, although significant differ-

4 For the various stock control processes see [11] and [15].

5 The tables in the text signify metallurgical enterprises by the codes K1 ... K4, and enterprises of the engineering industry by the codes G1, G2, ... G11.

ences continue to exist in the characteristics of the various supply services. At the same time, these characteristics occasionally illustrated certain similarities: thus, for example, the price of materials imported from some capitalist countries rose significantly, and the waiting time for their arrival became longer. In contrast, some of the domestic enterprises experienced a narrowing of their internal and external markets, yet they managed to improve the quality of their products and gave more consideration to the wishes of their buyers. Nevertheless, the narrowing of market opportunities causes strict limitations such as export constraint, the reduction of production capacities, the perpetuation obsolete technology and sometimes the poor quality of the materials delivered.

The relative permanence experienced in acquisitions is basically connected with the fact that the *supplying capacity of the individual channels has not increased significantly. Also, the monopoly position of suppliers, the restricted import possibilities, and the 'defenceless' position of the buyers have remained unchanged in relation to most products.* However, in those cases when the production capacity of the domestic supplier has made it possible to develop a larger than usual stock of finished goods (e.g. in the case of certain enterprises of metallurgy), and thus improved the scheduling of deliveries and the adjustment of sales items to the buyers' demands, then the high costs of financing the stocks of finished goods (costs which are not realizable in selling prices), and perhaps the related storage problems, may cause difficulties.

After making an analysis of the various supply channels we investigated the extent to which the structure of materials consumption (by species of material) had changed, as well as the factors contributing to the changes. As is commonly known, utilization is influenced by various factors, such as: the productive capacities and the technology of the user, the construction of his products, the proportions of the output as determined by the demand, the varieties of material which can be acquired, and the conditions of such acquisition.

The analyses of the enterprises under review have provided evidence which shows that the factors related to materials supply (i.e. the possibility of acquisition) exert a strong impact on short-term production programmes. If certain supply sources are blocked for a longer period, then the enterprise often attempts to produce constructions in large quantities, which utilize such materials and components as can be ensured with a greater security. This endeavour is also strengthened - over and above securing the appropriate level of production capacity - by an interest in maintaining a relatively evenly scheduled output and also in ensuring an appropriate size of price incomes.

Our investigations showed that a greater than average change in the structure of material consumption could especially be found in the smaller enterprises or in those carrying on individual or batch production. This was also true for electronic and machine-tool manufacturing enterprises characterized by fast production and by fast component exchange. However, it is not being suggested here that in enterprises with a less than average change in material consumption structure the change in product structure and product construction is necessarily slower compared with the former group. This is because the large and, under Hungarian circumstances, even the giant enterprises found it easier than those belonging to the former group to make themselves independent of external conditions in this field, too. For example, it was found that in several metallurgical enterprises, the ratio of products that have passed the second, third and fourth phases of the vertical set-up of processing was significantly greater - a fact which suggests a high degree of self-sufficiency and a high processing level of by-products. The large enterprises of the engineering industry also have, as a rule, a number of plants (foundry, machine-tool manufacturing, etc.) which ensure a certain self-sufficiency and autonomy. These factors protect the enterprise against some of the unfavourable external (e.g. against quality-related) effects. In the case of endeavours aimed at

self-sufficiency, profit- and price-income increasing considerations are, to a certain extent, pushed into the background by considerations aimed at ensuring the continuity of production and the utilization of capacity. At the same time, the user is often compelled to pay for the surplus inputs incurred - or at least for a significant proportion of them - in the price.

In the case of metallurgical enterprises an average 94 per cent of the planned quantity of materials was received by the enterprises in 1982, which changed into 86 and 89 per cent in 1984 and 1986, respectively (Table 1). At the same time, the quantity of annual utilization - measured in natural units and aggregated at enterprise level - differed to a relatively insignificant extent from the quantity of the actually delivered materials (Table 2). Thus in 1982 the utilization of materials was 97.4 per cent, and in 1984 - a year in which there was a significant fall in material deliveries - 102.5 per cent. Thus supplies somewhat declined to 99.1 per cent in 1986. At the enterprises of the engineering industry the quantity of the actual consumption of materials differed from the quantity of the given annual deliveries to a substantially greater extent than in the case of metallurgical enterprises. This was partly due to the delivery relationship between metallurgy and the engineering industry. Certainly the difference was more than would have been expected in view of the differences between planned and actual deliveries. In some years, at certain enterprises, actual material consumption often lagged behind annual acquisition by more than 10 per cent. On the other hand, there were some enterprises in which annual material consumption surpassed the material deliveries of the given year by more than 10 per cent. Generally it can be stated that the connection between the ratio of the quantitative indices of delivery and material consumption and the scheduling of material deliveries is rather incidental.

The quantitative distribution, by month or by the quarter year, of the delivery of materials in metallurgical enterprises met expectations in 89 to 90 per cent of the cases, while enterprises received 86 to 94 per cent of the ordered quantity of materials on average in the years under review. Owing to significant differences, an appreciable spill-over effect of the input-related problems of the metallurgical enterprises was exerted - through the quantitative and scheduling characteristics of their output - on the users' production and stock-keeping capacity.

According to our survey it was a common experience that less than two-thirds or a half of the quantity of certain basic metallurgical materials ordered was sent to the users in one year. *In the enterprises of the engineering industry the quantitative characteristics of the actual material deliveries deviated from the planned material deliveries in the case of about half of the species of materials to such an extent that they influenced the composition and volume of production and sales and the efficiency of production. Most of the significant quantitative deficiencies had negative consequences. Quantitative shortage had a favourable effect in the case of badly estimated demand (and this was not a rarity either!). Positive consequences were 'signified' by the enterprises mostly in those cases when materials of a 'better' than usual quality were received in a larger than expected volume.⁶ It is characteristic that most of the negative consequences are experienced at the smaller enterprises. This is mainly due to the inappropriately scheduled deliveries. In analysing the evaluation of enterprises it must be taken into account that under the conditions of a shortage economy enterprise behaviour adjusts in advance to the peculiar purchasing conditions, and thus the evaluation system is significantly distorted. Unpredictable imports also play a part in forming enterprise results (profits, incomes) and these are far from being negligible. The costs of enterprise actions which try to ensure manufacturing security are necessarily dependent on*

6 The growth of the proportion of up-to-date, more valuable and better quality products attributable to such causes, and the maintenance of their proportion cannot be generally guaranteed for the years to come.

Table 1

**The average ratio of the planned and actually delivered material quantities
at the enterprises under review in the years 1982, 1984, 1986**

Year	K1	K2	K3	K4	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	Average
1982	1.016	1.039	1.129	1.088	n.a.	.977	1.018	1.406	n.a.	n.a.	1.056	1.140	n.a.	.982	.991	1.077
1984	1.123	1.064	1.120	1.333	n.a.	.983	1.008	1.397	n.a.	n.a.	1.020	.965	n.a.	.921	1.005	1.085
1986	1.098	1.042	1.188	1.143	n.a.	.956	.987	1.407	n.a.	n.a.	1.053	1.053	n.a.	.980	1.043	1.085

n.a. = no data available

Table 2

**The average ratio of the material consumption and the actually delivered
material quantities at the enterprises under review,
in the years 1982, 1984, 1986**

Year	K1	K2	K3	K4	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	Average ^a	
1982	1.007	.967	.945	.975	.976	.850	1.022	1.051	.990	.987	.769	1.097	.906	.875	1.000	.962	(.961)
1984	1.084	1.000	.999	1.017	1.002	1.037	1.013	1.052	.977	.965	.894	.895	1.052	.941	.994	.996	(.994)
1986	.984	.986	1.003	.991	.931	.967	1.007	1.044	.883	1.054	1.106	1.149	.955	.915	1.021	1.000	(1.016)

^a In brackets: the average of the 11 enterprises listed in Table 3 (i.e. the average does not include enterprises G1, G5, G6 and G9).

the long-term demands of materials procurement and the unpredictability of the distribution of deliveries. Such uncertainties may be decreased by events which are more favourable than expected and increased by the less favourable ones. The demand and quality consequences of the modifications of the production programme have to be borne in most cases by the buyers, while the manufacturing enterprises seldom suffer direct disadvantages because of these difficulties.

Analysing the inventory consequences of the conditions of material acquisition, we can state that, at the enterprises investigated, the material inventories amount to a relatively stable 15-16 per cent of their annual consumption. This means that we have to reckon with a *safety stock of material and component inventories lasting two months on average*.⁷ The dispersion behind this average is substantial. A significant interrelation was found between the size of the enterprises and the development of stock/consumption: the level of this indicator is lower at the larger enterprises (hence they are operative at a lower stock level), while the smaller enterprises work with higher stocks. This phenomenon is explained by several factors:

1. a significant number of large-scale enterprises exemplify a *vertical set-up*. This enables them, for organizational reasons, to work with relatively smaller stocks of raw materials, while the stocks of intermediary materials are usually larger than in the case of small-scale enterprises;

2. the larger enterprise - even if it is basically of a horizontal set-up - is generally *more self-sufficient* than the smaller ones in the production of certain important inputs (for example alloys, tools);

3. with regard to acquisition in the domestic markets, large-scale enterprises enjoy a natural advantage relative to the smaller ones. This is because of the *sizes of their orders* and the economic policy priorities which are often attached to such orders;

4. co-operatives and small-scale enterprises are compelled to resort to the less secure and usually more expensive supply sources, and the limited acquisition safety makes it necessary for them to keep larger stocks.

In the case of activities using more complicated technology and depending on more suppliers and more component deliverers, the stock/consumption ratio is also higher than at the enterprises performing the earlier, simpler phases of processing. This is basically due to the fact that a given product is usually composed of several components, and when *placing its orders*, the enterprise usually asks the supplier to deliver a quantity larger than its actual use. In order to encourage the supplying firm to start business with it, the enterprise is compelled, on the one hand, to place the so-called 'minimum quantity order'; on the other, since the costs (which cannot be spread out over a period of time) and the labour inputs of the acquisition are high, it can raise the lot-size of the order to a quantity covering its use for several months and several quarters of year. Thus the specific values per product unit of the procurement input can be diminished.

With reference to individual years, a very different inventory stock of *individual materials* is hidden behind the relatively high aggregate stock levels. In the case of one sixth of the materials and components included in the enterprise surveys, the 'average stock' determined as the arithmetical mean of the stock at the beginning and at the end of the year surpassed, at least in one year, the given annual consumption in the period under review; in one quarter of them we are faced with a phenomenon which recurred over several years (*Table 3*).

It is generally not characteristic of metallurgical enterprises that they hold such large stocks of basic materials as would appear to be absurd. The occasionally

⁷ Conversely, the production sphere in most developed capitalist countries keeps materials to be processed at most for between 3 to 6 days [3].

**The extreme stock/consumption ratios of materials
(The 'average stock' surpassed the annual consumption
at least in one year)**

Enterprise	Material	1982	1984	1986
K1	6.	1.15	.58	1.19
K2	15.	1.43	1.53	.94
K4	5.	5.75	.11	.19
G1	4.	.12	.21	3.82
	6.	6.29	.51	.06
	7.	2.91	.63	2.31
	8.	1.97	1.29	34.36
	10.	.16	.53	1.96
	15.	.90	.13	12.46
G2	4.	1.09	.15	.14
	5.	1.44	.21	.23
	13.	2.55	.72	.24
	14.	2.30	.12	.00
G5	2.	.37	1.84	.28
	3.	.64	1.80	4.25
	4.	.79	1.63	.98
	5.	.88	1.71	.84
	6.	3.71	.85	.80
	10.	.52	.38	1.08
	13.	1.83	.76	.67
14.	.55	.21	1.03	
G6	6.	.14	4.50	.18
G7	1.	.32	.30	1.11
	3.	.31	1.08	.42
	7.	.27	.60	1.44
	8.	1.50	.58	.00
	12.	.15	1.46	.24
G8	3.	.19	1.44	1.17
	5.	1.15	.64	1.51
G9	6.	1.43	.23	.45
	11.	-	1.06	.14
G10	1.	2.69	1.30	.66
	8.	.03	1.20	.80

high stock levels utilized in enterprises of the engineering industry are more typical than in those of metallurgy. Stocks covering the utilization needs of more than two years are not rare, even if this does not frequently occur in the case of materials and components constituting a substantial proportion of the material costs of products manufactured in a large volume. With some of the 'problematic' materials, however, the ratio of consumption to 'average stock level' shows a relatively extreme fluctuation - and this does not exclusively occur because of the accidental elements of stock-building.

3. The Hindrances Arising from Financial Regulation and Problems Related to the Rationalization of Materials Management

The institutions of central economic management exert an influence not only on the magnitude of incomes remaining at the enterprise, but also regulate the use and conversion of certain resources. In addition, they decide what amount of money should be sent on these resources. Economic management is unable to keep investments and the purchasing power of the population within limits by means of the market. Therefore it tries to establish equilibrium by laying down detailed financial rules and prescriptions. In this respect it is important for economic management to determine, and to 'regulate', how much the economic agents can use of the individual factors of production. Being production factors themselves - and, as we shall see, being parts of the aim of utilization - the enterprises have to bear tax burdens and income restrictions of very different progressivity when increasing the quantity of the individual factors of production to be used. As a result, the cost sensitivity of combining and substituting the resources can be computed in a very intricate way. *It is these various return requirements, set to cost inputs with different aims of utilization, that are called the 'labelling' of forints in Hungarian economic parlance.*

According to the manager of one of the big enterprises investigated there exist more than a hundred various 'labelled' forints at the enterprises, and their number in the economy as a whole may even be put at thousands [1]. Let us look at some of them, together with their impact and their effect on materials management!

Despite the high ratio of material costs, it seems that the enterprises investigated do not pay appropriate attention to the formation of this cost element. This is due to several factors, some of which we have already looked at. The existing counterinterest or lack of interest can be pointed out in a number of ways. The rational management of materials is impeded to a significant extent - among other things - by the dominant short-term approach, by regulation problems and by the low cost sensitivity of the enterprises. [7, 12, 14] Owing to the stipulations of the regulators, the enterprises cannot convert the forints they have saved in the field of materials procurement into another 'cost-money', for example into 'wage forints'. Thus in 1987 it was generally 4 forints of materials saving that was necessary to make a wage payment of 1 forint. *The limitation of convertibility due to administrative measures or through the many coefficients of income regulation leads to such irrational steps as are unknown under real market relations.* Since neither the enterprises nor the individuals are really interested in paying attention to the material costs, squandering has become a frequent occurrence.⁸ Economic agents can do this because, firstly, material is a production factor available with the least limitation (except for certain basic materials of socialist origin and capitalist imported materials in general) and, secondly, because the price constraint of output is relatively weak. Therefore they can offset their higher costs by price rises or by producing quality goods.

In respect of the 'soft' or 'hard' quality of materials-money, there are significant differences between the 'forints' available for domestic materials and those available for imported materials (especially imports from capitalist sources). Here a number of other barriers must be added to those already mentioned above. Such are, for example, the licencing system, the rigid system of contingents in trade

8 One of its common but important contributory factors lies in the fact that the enterprises, being justly afraid (on the basis of their experience) that their money reserves will be taxed away, hide part of their liquid money from the managerial organs in the form of material inventories.

with the socialist countries, the lack of actual convertibility, the problems of the domestic price and the taxation system. The prices of imported basic materials are set, often for debatable reasons, at an artificially high level, and encompass the whole of our economy. Consequently, there are unfavourable influences which affect the efficiency and competitiveness of quite a few enterprises. We have already mentioned that in the case of materials secured from various sources, the delivery time, quality, packaging, etc. display substantial differences. Thus in the case of several materials - as a result of processing inputs, scrap losses, stock-keeping costs, and other interests - a number of incidental costs arise, and these are qualified by the economic agents partly as material inputs, and partly as other cost elements. Hence, the divergent parameters of material procurement from different sources exert a lesser effect on prices, while their effect on production costs is very significant. The forint paid out for materials imported from capitalist countries is therefore 'hard' money, because its availability is limited. Thus the problems arising for the enterprises in that field are less attributable to direct import costs.

Serious problems make themselves felt, owing to the 'labelling' of forints, in the rationality of the management of fixed assets [2, 5, 13]. The main problem results from the fact that the *financing sources of current production and of development are different*. The enterprises may qualify their inputs related to the maintenance of their fixed assets as their costs, and as long as the prices or the profit can cover them, this practice can be pursued - in principle - without any limitation. At the same time, the money resources available for investment are taxed forints. In 1987, for 1 forint of investment - as a function of the measure of taxing away - a profit of 3.0 to 4.5 forints was needed. The size of profit is, owing to income regulation, strictly limited. Thus the enterprises often qualify part of their development costs as maintenance and material costs. *Thus the material costs also rise as a result of the fact that the investment money resources of the enterprises are limited*; namely, they may, in essence, make investments by increasing their material inputs. For this an instructive example is provided by the case of enterprises' vehicle renewal strategy. As the buying of a lorry can only be made from the taxed development fund, and certain types in great demand are available only after waiting for a long time, the enterprises slowly 'renew' their vehicles by purchasing the main components and part units. Hence they replace, say, the front and the rear axle, or the engine of the given lorry over a period of two years - and all this is qualified as current (non-taxed) expenditure. In this case there are two consequences. First, the retention of investment funds may result in the perpetuation of the existing technological level. Second, as the 'impossibility of complete regulation' necessarily involves evasions, the above-mentioned solution is often more expensive than investments.

As the 'material-forints' are also different (depending partly on the procurement source of the given material), the same is true of the money available for spending on fixed assets. The money that can be spent on fixed assets is the 'hardest'. It is possible that the enterprises have a sufficient development fund, or their credit facilities are insured, yet they are unable to replace their worn-out fixed assets, because they can only be obtained from capitalist sources. On the other hand, they may be unable to secure the components needed for their machinery because they have already exhausted their fund for this purpose. It is a further trouble that the 'capitalist import forint' available to the actors of the economy is not uniform either, because the forints for capitalist import-material and for capitalist import-machinery are not of a free mutual convertibility.

While we can state that in general the enterprises are insensitive to costs, in respect of the wage costs a very strong sensitivity has developed; in other words, *the wage input is regarded as 'hard' money* [8, 9]. The reason why the economic agents pay such a pronounced attention to wages, lies in the interest system. On the other hand, the enterprises would like to keep their employees by means of

wage and income increases' as growth plays a prominent role among their aims. On the other, central economic management also pays special attention to the development of wages and incomes, exactly in the interest of the implementation of social policy and of the regulation of purchasing power. At some enterprises the possibility of increasing the evolved wage fund and of raising the wage level depends on the formation of enterprise profits, although larger pay rises are prevented by the very steeply progressive profit taxation. In addition, it may occur that the management organs take it amiss if the economic agents exceed a certain level when raising wages. In 1987, an output of 1 forint appeared for the enterprises - owing to various wage-related taxes - to be 2 forints of cost in reality. This is without mentioning the expenses of social policy, which constitute a very serious cost burden. In addition - like the other inputs - the money paid for the remuneration of labour is not uniform; in other words, the inputs are taxable to a divergent extent, and they burden the so-called fund of interest in different proportions.

It is possible for the enterprises to keep their labour force by wage payments, but it is much more difficult to stimulate workers to use materials economically. At present, 1 forint of additional wage payment can be made on average for 4 forints of material savings. However, this is not a sufficient incentive for the rational use of materials. Therefore, 'labelling' as a means of regulation does not efficiently promote the decrease in material inputs by means of wage management either.

Concluding Remarks

In our study we have surveyed some of the factors responsible for the large material inventories of Hungarian industry, and for the commonly-known high material consumption of production, both from the viewpoint of enterprise materials management.

We have stated that the large material stocks of the enterprises are due to several interrelated factors: long and uncertain supply times, the basis approach prevailing in stock management, the organizational deficiencies of the materials management processes within the enterprise, and the excessive security measures arising from acquisition uncertainties. As manufacturing to order is the general practice, Hungarian industrial enterprises have to place their orders long before they start production. They have to do this with very superficial knowledge of the structure of the products they wish to manufacture and with little idea of the products which are in demand on the market. Therefore, the statement relating to materials demand and the necessary stock level decisively relies on the relevant data of earlier periods and quarters, and on estimates based upon them. The uncertainty of the statement relating to materials demand in itself stimulates exaggerated caution, to which can be added the great uncertainty of external purchases caused basically by the low finished-goods inventories of the enterprise. The endeavours caused by exaggerated caution are only partly limited by cost considerations because those related to stocks (material stocks) are, along with the security of production, pushed into the background. Finally, with respect to the stocks, the absurdity of the situation is characteristic, despite the availability for several months of the work-in-progress inventories; also shortages often hinder production and the flexible satisfaction of the buyers' demands.

In the early 80s, the retention of economic growth, the financial restriction campaigns and measures aimed directly at the improvement of stock management, and the reduction of material-intensive production did not bring about any change

in materials supply and stock-building relations. A basic role in the unchanged relations was played by the fact that the delivery proportions of the supply sources, and within them the shares of concrete suppliers in general, displayed a great stability at most enterprises in the period under review. The delivery capability of the individual channels (suppliers) did not grow appreciably, and the monopoly position of the suppliers, along with the buyers' 'defencelessness' with respect to certain products, continued to exist.

The enterprises have great experience in the field of adjustment to uncertain material purchases. Despite this fact it could be stated that even in the case of materials of basic importance for production and used in the largest volume, the quantity scheduling and quality characteristics of delivery deviated from the planned ones to such an extent that they necessarily modified the composition and volume of enterprise production, as well as the sales and efficiency of enterprises in most cases, in an unfavourable manner. In the past few years no fundamental changes have taken place in the conditions of material procurement, such as would have resulted in the stocks of enterprise materials and finished-goods becoming more balanced, or would have eased the shortage of materials stocks in demand.

The materials intensity of production is influenced by several factors: primarily by purchasing prices and by the quality and storing costs. At the same time, the enterprise possibilities of materials-intensity are confined to a relatively narrow range. The technically possible (for reasons of business management) rational substitution and combination of the various resources (materials, fixed assets, labour force and their components) are restrained by the very divergent return requirements laid down for the individual factors of production. They are also impeded by the shortage positions and limitations not reflected in prices and costs. In addition, the increase in material costs comes up today against much less hindrances than the expansion either of labour input (wage costs), or of the volume of fixed assets. This diminishes to a certain extent the interest in decreasing material costs, and exerts in certain cases - for example in technical maintenance - an effect which works in the direction of increasing material costs. Due to the lack of competition, the distribution of costs has no market limitation and no market constraint which would stimulate the minimizing of costs in general, and within this the costs of materials and of stock-keeping.

The unfavourable external conditions have created a situation in which a very high level of disorganization is now accepted within the enterprises. Although the deficiencies within the enterprise also contribute to the problems of materials management, the main reasons for the unfavourable conditions lie outside the individual enterprises: they are connected with acquisition constraints and administrative prescriptions which distort the interrelation system of enterprises. Also to be taken into account are the problems related to the distribution of the factors of production, which are in turn related to the underdevelopment of market institutions, to the hierarchic dependence relations and to the high-level of autarchy - despite significant foreign-trade activities. A basic change can be brought about only by changing these factors.

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INTRODUCING AND APPLYING CAD SYSTEMS IN HUNGARIAN INDUSTRIAL COMPANIES

ANDRÁS BÁNKY

1. Clarification of Concepts

Computer aided design (commonly abbreviated as CAD) is a design technology which - by means of a computer system - helps the construction engineer in each phase of technological designing (construction, modification, analysis, optimization). The system itself consists of hardware and software.

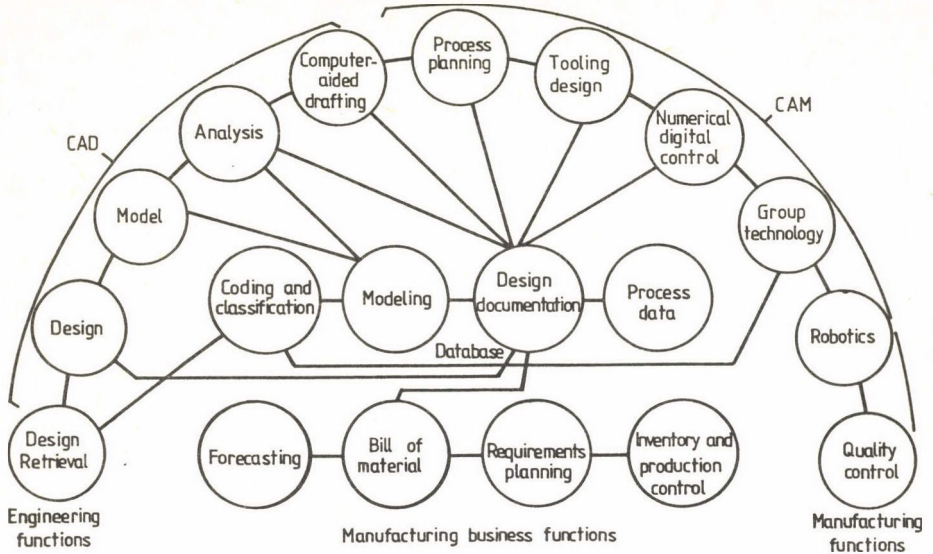
Computer aided design offers several advantages, although only a few of them can be measured directly. For instance, the improved quality of work is very difficult to quantify. Other advantages are much more palpable, but the resulting savings emerge only later, in the process of production.

Today it is already clear that the major part of these potential benefits offered by CAD may be actually utilized only by linking up the computer aided design process with production itself. Technical-technological development is now unambiguously heading towards the integration of the formerly strict separation of functions of designing and manufacturing. This integrating role is played by the computer. Nowadays, it is seldom possible to read about CAD as such; instead, a new concept has appeared: computer aided design and manufacturing (CAD/CAM for short).

Computer-aided manufacturing (CAM), however, is not restricted exclusively to the monitoring and controlling of manufacturing processes. In other words, by being connected with a computer, directly or indirectly, it also comprises the tasks related to the planning, managing and supervision of the whole process of production. As may be evident from this definition, computer aided manufacturing may be divided into two main categories:

1. Direct computer-based monitoring and controlling (intervention, when the computer is directly involved in directing the manufacturing process. However, in this case monitoring is distinctly different from controlling).
2. Indirect computer applications, when the computer is used for optimization calculations of the manufacturing process and for the preparation of plans (designs), time-schedules, forecasts and information. This ensures the most effective possible exploitation of resources.

The functions that may be carried out through CAD/CAM, along with their connections with each other and with a data-base, are illustrated clearly in the following figure.



Integrated engineering manufacturing system
 (Adapted from Control Data Corp. data)

2. Company Motives for Using CAD

Hungarian companies which have to compete in the world market are increasingly aware that they will be unable to retain their positions unless they adopt the CAD (and then the CAM) systems. Also, they realize that the introduction of integrated computer systems offers the only way of maintaining competitiveness in the long run. In Hungary, by paying too much attention to international successes in this field, the application of computer-methods for development and construction purposes has often led to exaggerated expectations. As a result of certain ill-considered investments, the much expected increase of efficiency has failed to come about. Thus, after its initial enthusiasm, economic leadership began to experience a sort of frustration.

Searching into the causes of the failures, it should first be pointed out that company managements have not really comprehended the essence of technological construction design, nor have they been interested in making the most of the good opportunities offered by CAD/CAM.

For the automation of intellectual work - i.e. for computer-aided design - three direct motives are customarily stated:

1. To enable the highly qualified intellectual capacity - which is becoming relatively narrower and narrower - to be engaged in tasks unsuitable for automation.
2. To reduce the costs of intellectual work by using up the less expensive computer capacity.

3. The possible optimum (alternative) design results in the rise of the technological level of construction and of the quality of products. It also makes possible the repeated utilization of standard elements, reduces the occurrence of defects, and shortens the processing time.

Factors motivating the application of automation in Hungary do not or only very weakly make their effect felt. The reasons for this are seen to be the following:

- the low price of intellectual work does not create the urgency to apply computer techniques; in fact, the opposite effect can be observed since computer aided design costs more than the manual work;
- processing time will lessen only if immediate access to computer is possible. Owing to some other factors, it has not yet been possible to reduce processing time; thus it seems unnecessary to speed-up the calculations.

The joint absence of interest and economic pressure have retarded and isolated the endeavours of some highly motivated engineers to spread the new techniques. All this is well illustrated by the fact that the relatively successful applications introduced so far have mostly been realized due to initiatives and support coming 'from above'.

Yet, despite the difficulties, there are some CAD systems operating with increasing effectiveness in Hungary - although their use is in no way widespread. The reasons for this are varied. One reason, for instance, is that - as a result of bans on the export of high-technology (COCOM list) - the purchase of high-level design and manufacturing systems developed in the western countries meets with serious difficulties, even if the necessary funds happen to be available.

Beside the external limitations, internal factors also throw obstacles in the way of spreading the CAD/CAM technologies. Some of these factors are of a commercial nature (high prices, lack of incentives), while others can be traced back to the lack of enterprise and personal interest (monopolistic positions, a wage system which ignores actual performance and expertise).

3. Experiences Related to the Introduction of the Systems

The introduction of computer aided design within a company - and also in its related companies - affects almost everyone in one form or another.

Since in the western world a great number of these systems may be simply purchased as a product, most of the related investigations concentrate only on the effects a new system may have on a company.

In this case the following main questions are usually examined:

- what are the benefits (advantages) of the system;
- what justifies the investment, and how is it justified;
- the rate of return on the investment;
- the extent to which the investment improves the quality of a product and reduces its processing time;
- the respective roles of the top- and medium-level management;
- effects, both material and moral, on the user;
- whether or not it causes unemployment.

These and many other questions are important for us too, even if in several cases we tend to interpret them in a somewhat different way. However, in the rest of this paper, only some other - and in our opinion, considering the Hungarian environment, perhaps more important - aspects of the development and introduction of the CAD/CAM systems will be dealt with.

Under Hungarian circumstances, we cannot restrict ourselves to scrutinizing the problems of the reception of these systems, since it is more practical to examine them together with the problems associated with their development. The justification for this is that, at present, we do not yet have a sizeable CAD/CAM market. This is mainly due to the existing import restrictions and to the very small number of companies engaged in developing software for the market. Other questions of similar importance are: Why is it that this new design technology is spreading so slowly in Hungary? What factors hinder its spread in industry? To what extent is our essentially 'manual' system able to meet the demands of the market and manufacturing? Does our present technological level make the spread of CAD necessary and possible? What conflicts may arise during the introduction of the new method or, put in another way, what changes does the introduction require on the part of users? What results have been achieved and what errors committed so far?

The practice of computer-aided design in Hungarian industrial companies is a rather neglected field. Experiences show that not more than 30 per cent of all constructions exposed to a mechanical load is rated, and even among these only a few are fully calculated, calibrated, and controlled. Hence it follows that, according to estimations made by the subsequent use of available computer programs only, a material saving of 5 to 10 per cent can be reached on structural elements computed by these methods. By elaborating product-oriented computing methods through raising the precision of loading calculations, computing models and safety factors, the mass/performance ratio of products can be improved by at least 5 per cent - in certain cases even by 45 per cent. These figures are all well-known by the experts, yet the CAD systems have been unable to spread on a wide scale. The reasons are manifold and can be traced back partly to the contradictions of the economic environment, and partly to some internal factors operating within the companies.

4. Difficulties of Application

If a factory which has hardly used computers introduces a new CAD system, most of the would-be users are unlikely to receive it with exuberant enthusiasm since they will feel - and sometimes it is even true - that in addition to their present duties they will now be expected to operate a computer too. For instance, an automobile designer, who is very proficient in his work but has not yet seen an interactive (computerized) graphic workstation, will not use it unless he is obliged to (i.e. he fears that he will be expected to do double his work).

The company management may try to employ new people, more responsive to computer techniques, but such people are generally not adept in specific engineering tasks (e.g. designing car bodies). They will gladly 'play' with the computer, but this will not lead to the design of new products.

Today this is a contradiction that may be observed - to varying extents - throughout the world. However, it remains to be solved. The 'old' experts should be convinced of the advantages of the use of new computer methods and should be given time enough to get used to them and thus come to like them. On the other hand, the 'new' experts, responsive to the computer techniques, should learn the proper engineering-design work.

If the management cannot arrange things tactfully and fails to ensure a smooth transition, it may happen that the highly valuable and expensive computers and their accompanying equipment will never be properly used. Consequently, the investment will never be returned.

To sum up the general experiences - relying on the *opinion* of our experts in in-

dustrial companies - the following difficulties are encountered with the introduction and application of CAD systems:¹

A. *Factors impeding introduction of CAD systems:*

1. Lack of interest on the part of the company management (49)
2. Unclearified duties and rights (43)
3. The underdeveloped state of the information system (40)
4. Lack of experience in application (39)
5. Lack of special literature (35)
6. Shortage of experts (specialists) (30)
7. Shortage of capital (30)
8. Lack of appropriate preparatory work (23)
9. The unregulated state of the designing process (22)

B. *Factors impeding regular application:*

1. The increased number of daily tasks associated with the development (51)
2. Scarcity of funds (44)
3. Unsatisfactory standardization and typification (38)
4. Shortage of adequate equipment (36)
5. Lack of training and extension-training (31)
6. Exaggerated requirements of tolerance (27)
7. Deficiencies in information (25)

C. *Problems on the part of designers:*

1. Aversion towards the novelty (48)
2. Inadequate payment for the surplus work involved (47)
3. Passivity (40)
4. Regarded as the cause of an excessive workload (38)
5. Scarcity of adequate knowledge (33)
6. Lack of interest (30)

D. *Problems on the part of leaders:*

1. They are afraid of neglecting the performance of fundamental tasks (44)
2. They do not see the advantages of trusted, yet to them novel, design methods (41)
3. They tend to handle the new methods as, primarily, an opportunity for drawing additional income (34)
4. They doubt the abilities of the staff-members concerned with such matters (27)
5. Professional jealousy (26)

Problems of the data-base

Without computer-aid, the technological design of new, up-to-date products, their adjustment to actual conditions, and the operation and maintenance of complex systems are becoming less and less possible. Computer-aid, however, can be really efficient only if, in the data-base recorded in the background storage of the computer, the style numbers of materials and components to be built (or already built)

¹ Our experts were asked to arrange the individual factors into groups and, within these groups, to place the factors in an order of importance. The figure in brackets (percentage) following each factor indicates the frequency with which the given factor is mentioned.

in the given product(s), numbers of drawings, technological parameters, data on load, number of pieces, structural sizes and calibres, data on tolerances and other characteristics correspond, each with the other. They must correspond exactly, fully, unambiguously and in an up-to-date manner to the prescriptions, i.e. to the actually stored materials and components. In other words, computer aid can only be efficient if the *reality* and its *projections* within the data-base are in perfect harmony with each other.

Unfortunately, under existing domestic conditions, the task of ensuring that perfect harmony is always brought up-to-date seems to be a most difficult task. However, if this harmony cannot be ensured, the computer will not be able to execute its task properly. To quote one renowned Hungarian computer science expert: "a jumble, even if computerized, remains nothing but chaos".

As it appears, one key infrastructural issue related to the acceleration of the country's technological development concerns the way in which the information systems and data files of companies (e.g. the system involving the 'call numbers' of drawings) - can be made suitable for processing by machine. These have developed on the basis of traditions covering several decades, and thus they have become quite rigid; also, they are so jumbled and often contradictory that they are quite unsuitable for computerization. As an alternative, how can we radically change the information systems themselves so that they will be easy to handle by computer? In the latter case, the whole data file needs to be re-coded and this may, occasionally, imply the re-systematization and manual processing of many thousands or even millions of data.

Adding to this is the fact that the contents of the given data file - in both cases - must be controlled item by item to see whether or not they tally with the real facts and are up to the expectations. In this way the defects, superfluous duplications, contradictions and outdated data can be eliminated. It is only in this way that the data file may make itself suitable for handling by computer. Moreover, strict organizational measures should be taken so that the maintenance of the data file can be continuous and up-to-date. It is also necessary to see that the input of new data, and the deletion or modification of the old data, is carried out by not more than one responsible check-point. If such practices are not observed, it is inevitable that the data file will suffer injuries and become repeatedly 'infected' such that deviations from reality and from expectations will be 're-created' again and again.

It goes without saying that a computer-aid based on a realistic and up-to-date data file may give invaluable help not only to the technological design but also to manufacturing, quality-control and to maintenance.

5. Summary Conclusions and Recommendations

The past few years have brought very considerable changes both as regards technical-technological development and the economic environment. The application of CAD/CAM systems in industrial companies in the market-oriented countries has increasingly become a general practice and this trend continues to raise the level of demand on the part of the market. This rising demand also appears in the quality of products, their efficiency and also in a sharp price competition. The mentioned tendencies compel an ever wider range of industrial companies to computerize their design and manufacturing processes.

In Hungary, the technological renewal of design is going on very slowly, and it is laden with contradictions. The large number of types of hardware facilities had made the problem of compatibility a general one. The shortage that can be ob-

served in the field of hardware also appears in relation to the basic software necessary for the implementation of CAD systems.

Owing to the above-mentioned problems, a considerable part of the resources available for computer techniques are presently spent mainly on administrative and production-type data processing. Graphic data processing and technological problem-solving have not yet developed and thus have not yet become significant features. Computer resources are applied to engineering and technological tasks in such a way that the capabilities hidden in these facilities are not exploited to the greatest possible extent.

In most companies, the infrastructural background necessary for the efficient implementation of CAD has not yet taken shape. A considerable increase in effectiveness can only be achieved if the auxiliary facilities and activities are given the same attention as the computer itself. It is often the case that the necessary re-organizations, the provision of information supply and the resulting changes lead to success - but the same factors may also bring about failures.

In the following section there is a summary of the measures and organizational procedures which, in our opinion, could speed up, make more uniform and make easier the introduction and use of CAD systems in Hungary.

The related tasks present themselves at three levels.

At the level of the national economy

At this level it is necessary to create an environment which encourages companies to introduce CAD systems. Companies should also be given concrete help in their purchase (e.g. the reduction of customs on computer facilities, tax allowances for companies applying advanced technologies, and other financial concessions.

- Since the products designed by CAD are intended for manufacture, beside developing the production technologies, increased attention should also be paid to improving the quality of metallurgical products and to the production of new structural and synthetic materials.
- The cost price of the CAD systems is very high and therefore it would be practical to limit the 'variegation' of systems to be implemented in the future. A committee or similar organization - even if engaged in this activity on only a part-time basis - would be responsible for making recommendations on the hardware and software elements of CAD which could be best adopted in various fields of industry. Of course, to do this they should have full knowledge of recent trends, the world market supply and domestic conditions.

This committee or organization would register all the realized CAD applications, so that the introduction of incompatible systems could be avoided, servicing would be simpler, and all this might result in a broader software market.

At the company level

It would be practical if the companies could prepare plans to develop information technology within the company. This would yield a double benefit: on the one hand, it would lead to the discovery of loops and dead-ends hidden in the present flow of information and, with these eliminated, the company's work could be greatly improved; on the other hand, in case of a decision related to the introduction of

some kind of computerized technology, based on the already elaborated plan, it would be possible to formulate, more rapidly, a strategy for introducing (in this case) CAD.

- In the course of the further development of their activities, the companies ought to take into account the possibilities of joining in the CAD/CAM systems to be introduced in the nearer or farther future. ('Stepwise' strategy of development.)
- It would be useful if the companies which plan to introduce CAD systems in the foreseeable future, had easy access to institutions well-versed in computer technologies. They could then obtain expert advice, and thus make a selection of a really sound system out of the many systems available on the world market. In the case of domestic developments they could acquire exact specification statements - these being of the utmost importance.

A system which is not best suited to the particular tasks of the given company would cause a lot of anguish with its use and - what is even worse - would work at a loss.

- The introduction of the CAD system into the course of day-to-day work requires very careful preparation. It is necessary to set up a group which is engaged in CAD only, and its place should be very cautiously selected within the company structure.

Instruction directly connected with what should be known of CAD/CAM in general needs to be provided for future users at an early stage - perhaps at the time of the birth of the idea. If, however, a similar system is already at work somewhere, it is advisable to launch a long-term cooperation as soon as possible.

- Finally, it is also important that when CAD is introduced the designers should be made interested in one form or another in the use of the system. They should appreciate that they have been given good chances for both learning and using the computer techniques.

At personal level

In the case of the introduction of the CAD system, the most difficult but the most important task falls on the user (the designer or constructor).

The user has to recognize that computerized technology will make work easier rather than more difficult. However, the user must realize that only after strenuous efforts (and overcoming the love of the older techniques to which he or she is accustomed), will he or she learn to master the system. The user's curiosity and responsiveness to what is a novelty should be placed to the fore, and should reach such a high inner motivation that it will enable him or her to operate the system even under adverse circumstances.

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PROMOTION AND LIMITS TO THE APPLICATION OF INDUSTRIAL ROBOTS IN HUNGARY

MÁRTA KIEFER

It is common knowledge that no competitive industrial product pattern can be composed without an up-to-date production culture. An important condition of the latter is the quick introduction of new technical equipment and technology as well as the setting up of flexible manufacturing systems (FMS) to support them. Industrial robots are a vital element of that process.

What do we mean by industrial robots? The answer is not so simple, for a great number of definitions are currently in use. I opted for two of them and for the purposes of my research I mean by 'industrial robots' the following: re-programmable, multi-purpose manipulators connected up to some processing unit and equipped with more than one grade of freedom, servo or other control and possibly also with sensors. Such manipulators are capable of moving objects, parts, tools and special devices along various pre-programmed paths in order to perform a particular task.¹ (Consequently, manually controlled manipulators did not form part of my research.)

The experiences I am going to recount have been collected in the course of several case studies and questionnaire surveys made at 20 industrial companies. The survey covered nearly 75 per cent of all industrial robots in use, i.e. 51 samples. One aim of my research was to explore the composition of industrial robots, the reasons for the delay of their introduction in Hungary, the difficulties of integrating them into industrial production and the relevant long-term concepts. Another aim of the research was to analyse the reasons behind the troubles with the purchase and operation of robots, and to investigate their impact on the product pattern. This article sets forth a few major findings of that research.

Phasic Delay in the Introduction of Industrial Robots

International experience indicates that 60 to 64 per cent of all robots were purchased in 1984/1985. This acceleration must also have played an important role

¹ Source: based on the definitions of the CMEA draft norm concerning industrial robots, prepared by the International Standard Organization (ISO) and Hungarian experts. Trends in the Manufacture and Application of Industrial Robots, Budapest, 1985, Central Statistical Office of Hungary.

when the number of robots employed in Hungary nearly trebled between 1981 and 1986. (*Table 1*)

However, *Table 1* shows that the very first robot was introduced in Hungary in 1972, while in industrialized countries this same event happened some 5 or 10 years earlier. The lag grows, however, much bigger if we look at the number of robots put into operation in the period following the purchase of the first robots. While a total of 70 robots were installed between 1976 and 1986 in Hungary, in the US as many as 20,000 units were put into operation in the years between 1961 and 1985. As compared with Hungary, the proliferation of robots was much quicker in Great Britain and West Germany as well. (Between 1983 and 1985, the number of robots grew from 1,753 to 3,208 in Great Britain and from 4,800 to 8,800 in West Germany.)

Technical Level and Country of Origin of Robots Installed

With regard to the technical level of development of the robots under survey, a widely varied picture presents itself; however, it is fair to say that most of them are less sophisticated ones of the so-called first and second generations. My research showed that 53 per cent of all robots in use are of the second generation, i.e. programmable robots with a rather simple memory; 34 per cent of all robots in use are from the first generation. (Most of the latter are mechanically controlled and cannot be programmed for more than one operation.) Unfortunately, the share of so-called intelligent robots in Hungarian industry is a mere 3.9 per cent, while in industrialized Western countries they account for 30 to 50 per cent.

In my view, this gap has been caused, among other reasons, by the backwardness of both the manufacture and development of robots in Hungary. (*Table 2*)

Of the numerous drawbacks caused by the relatively backward state of robot manufacture and robot development in Hungary, I want to focus on the disadvantages arising from the fact that most robots are available from imports only. It is no accident that no more than 7 (13 per cent) of the 51 robots used by the companies under survey are Hungarian-made and that the bulk came from (mainly Western) imports. The overwhelming number of robots in use came from Western Europe and Japan. In fact, the industrialized Western countries export a great number of robots; the difference, and the trouble, is that this is not the case in Hungary. Dollar exports, and the export of robots in general, play a much lesser part here. The negligible exports we do make go mainly to CMEA countries. Taking the decisive but less and less preservable role of convertible currencies into account, one must admit that the prospects of purchasing robots from the West are not too bright. Consequently, the aim of spreading industrial robots quickly is of questionable viability. (As I will expound it later, robots imported from CMEA countries are of such poor quality that they are highly unlikely to replace ones imported from the West for a considerable time.)

Fields of Application of the Robots in Use

The stage of development of robots in use is, among other things, indicated by the type of work such equipment is capable of. International tendencies suggest that the more advanced the robots are, the bigger the share of those suitable for more sophisticated tasks is.

**Major milestones in the introduction of industrial robots in Hungary
and in some industrialized Western countries**

	Country	Year	Estimated delay (in years)
First US-made robot (Unimation) installed at General Motors	USA	1961	
First US-made robot installed at NISSAN	Japan	1967	
First US-made robot installed in Sweden	Sweden	1967	
GKN buys licences from Unimation	Great Britain	1965	
Purchase of first robot (CsMSzG Unimate MKII)	Hungary	1972	5-10
Industrial application of system including several servo-controlled robots at the Hódmezővásárhely plant of FIM (Painting)	Hungary	1977	10
200 robots employed in domestic industry	US	1970	
20 robots employed in domestic industry	Hungary	1981	15-20
70 robots employed in domestic industry	Hungary	1986	20-25

Sources: British Robot Association, *Robot Facts 1986*; *Production and Use of Industrial Robots*, New York, 1985, UN; *Prospective Impact of Robot Technics on the Hungarian Economy*, Budapest, 1986, OMFB; *Science and Technology - Report 1984-85*, London, DTI; M. Kiefer, *Stimuli and Hindrance to the Application of Industrial Robots in Hungary - Research Report*, Budapest, November 1987.

**Major milestones in the manufacture and development
of industrial robots in Hungary
and in some industrialized countries**

	Country	Year	Estimated delay in years
George Devol's patent for a universal automation applied for	USA	1954	
First Hungarian robot-related patent applied for	Hungary	1975	
Based on Devol's patent, manufacture of robots launched at Unimation	USA	1960	
Kawasaki buys licence from Unimation, US; domestic manufacture launched	Japan	1968	
Domestic manufacture launched	Sweden	1971	
For an order from the Soviet Union Tungsram begins manufacture of reloading robots Type MTE 55	Hungary	1981	5-10
General Motors launches manufacture of universal assembly robots (PUMA)	USA	1975	
ASEA markets in robot with electric servo-control	Sweden	1974	
CsMEG's robot with hydraulic servo-control and Rekar'd's (Győr) robot with electric servo-control put on the market	Hungary	1985	10-15
SZTAKI's seeing module displayed at the BNV	Hungary	1984	5

Sources: *Production and Use of Industrial Robots*, New York, 1985, UN;
Prospective Impact of Robot Technics on the Hungarian Economy,
 OMF B Study, Budapest, 1986;
Science and Technology - Report 1984-1985, London, DTI.

With regard to the fields of their application, robots come under the following headings: processing, assembly, servicing, material handling, measuring and controlling. Using these international categories, robots installed (and surveyed) in Hungary breakdown in the following way:

Table 3

**Breakdown of robots installed at the companies under survey,
according to their main fields of application in 1986**

Type of robots according to their main fields of application	Number	Percentage
	of robots	
Processing	19	37.2
Assembly	1	1.9
Servicing	29	56.8
Material handling (between sites)	-	-
Measuring, controlling	2	4.1
Others	-	-
Total	51	100.0

As Table 3 shows, servicing robots account for 56.8 per cent, or more than half, of all robots used by Hungarian companies. (Most are robots servicing CNC machine tools.) The second biggest group is that of the processing (primarily welding) robots: 37.2 per cent. The small percentage of assembly robots and the lack of those for measuring and controlling is striking. It is the low percentage of assembly robots in particular that indicates the close relationship of the technical level and field of application of robots. (As I mentioned before, robots in Hungary are mainly of the first and second generations and as such are, as a matter of course, unsuitable for performing more sophisticated and highly demanding assembly work.)

**Character of the Robots According to Operation Integration -
Questionmarks Concerning the Extent of Progress**

With regard to their profitable employment, the character and quality of the integration of robots is a matter of great importance. If we consider profitable operation and the achievement of a flexible pattern of products, it makes quite a difference whether a robot is working on its own or as a part of some flexible manufacturing unit, cell, or system. International experience indicates that most robots are employed in flexible manufacturing cells or systems (FMS). (The percentage of robots employed in FMS is around 10 per cent in Great Britain, but as high as 50 to 60 per cent in the US and Japan, and 15 to 35 per cent in Western Europe.)

The situation is much less rosy if we look at the Hungarian companies under survey. There are very few flexible manufacturing systems and the percentage of robots applied in flexible manufacturing cells is also much lower (Table 4).

Actual and projected breakdown of robots in use according to the integration of operation

Type of operation integration of robots	Actual and projected breakdown of robots according to their operation integration			
	1986		1987-1995	
	Number	%	Number	%
Individual operation	28	54.9	15	29.2
Part of flexible manufacturing unit	15	29.4	10	19.6
Part of flexible manufacturing cell	9	15.7	21	41.1
Part of FMS	-	-	5	10.1
Total	51	100.0	51	100.0

Thus it can be seen that in 1987, 54.9 per cent of all robots under survey (over half of them) were operated individually. The rest formed part of a flexible manufacturing unit or cell, although the share of the latter was smaller (15.7 per cent). No examples of FMS could be found.

The picture is brighter for the future. It is expected that in ten years 10.1 per cent of the robots owned by the companies are going to be operated within an FMS and the share of robots operated individually will be reduced by half. (This will still be a pretty high proportion: 29.2 per cent.)

As for the reality of such plans, two major questions arise. Considering the already urgent need for a flexible modification of the industrial product pattern, it is open to question if such progress can be made if over the next ten years every third robot is individually operated. The proportion is too high even now, especially if compared with the practice of industrialized countries. On the other hand, it is doubtful if the problems to be discussed later (concerning organizational issues and background industries) can be successfully coped with in the years to come.

The Reasons Why Companies Install Robots

I found that the uniform attitude of company managements, which was displayed in the first stage of installation (i.e. in the late 1970s), is no longer there. For years, the motivation for many companies was that the introduction of robot technics might improve the company's image, being the equivalent of quality and progress and a favourite catchword in advertisements. It is significant that in their replies to my questions, 80 per cent of the companies listed prestige considerations as a motive for installing robots.

Among the major reasons for acquiring robots, all companies cited the desire to achieve better productivity and to realize shorter production times and the need to employ less live labour. Besides polishing their prestige, most companies stressed their desire for uniform quality and quicker changes from one product to another. Surprisingly enough, less than one half of all companies surveyed expected their robots to help them raise their products to a higher category of quality. It is just

as remarkable that not a single company mentioned the saving of material and/or energy, or the reliable maintenance of a continuous working order.

Quality, Price and Servicing: Differences Between the Sources of Robot Supply

As the composition of robots in use has already indicated, most companies under survey prefer Western imports to domestic or CMEA sources. There are two decisive reasons for this: the quality and servicing of robots made in the West are much better. As I see it, it will continue to be difficult to purchase industrial robots which can be integrated into manufacturing lines and which are equipped with state-of-the-art control, adaptability and sensors. One of the problems is that despite dynamic development, the socialist industry has not come up with such equipment. Even the simpler socialist constructions in use are not reliable enough and difficult to maintain. Another big drawback in the socialist countries is that no so-called 'engineering service' follows the sale of robots, i.e. they do not venture into a deliberate robotization of complex tasks and full processes. In order to alleviate this problem, several attempts were made to set up consulting offices in Hungary, but I do not know if any of them have succeeded. As I was told by companies, despite many advances the robot industries in socialist countries (chiefly in Bulgaria and Poland) cannot produce equipment of passable quality and they are not willing to supply more up-to-date equipment to Hungary (the considerable amount of dollar imports required for the manufacture of equipment of higher technical standards makes a normal exchange of commodities within the CMEA impossible.)

The purchase of robots in the West poses at least two obstacles. First, high-tech robots are embargoed. In contrast to the practice of the 1970s, when the control unit of robots featured relatively simple electronics, state-of-the-art robots are often on the COCOM list. The embargo ties the hands even of Hungary's long-standing trade partners, like ASEA's. However, buying robots of a lesser quality would only preserve today's technological standards and widen the gap between the industrialized countries and the domestic industry. The lack of foreign currency is another problem. Targets set by the CMEA cooperation, and the grave economic situation of Hungary, exert a dual pressure on companies not to spend dollars on equipment. This strong pressure misses the point since more expensive socialist equipment results in a lower standard of manufacture.

From my experience it seems that the average cost of the establishment of a robotized job-site (designed for technological tasks) is over Ft 10 million. However, in nearly 50 per cent of all cases, the intellectual and material expenditure on peripheries and technological equipment for an operative technological system is often more than that of a serial, and virtually universal, robot. It is often argued (and this fact hampers the establishment of complete technological systems) that price should be the only consideration applied to questions of robotization: this misleads potential users. By the latter I mean not only companies but also institutions participating in the financing, such as the Ministry of Industry, IMFB, etc. It may lead to mistakes if the allocation of central monetary sources which are meant to promote the robot programme, is decided upon on the basis of incorrect knowledge of the actual costs.

Inconsistent Customs Duty Policy and the Lack of Complete Modern Robot Technological Systems

The data given by companies indicate that even the combined sum of their own and central resources, earmarked for the advancement of robot technology, was not enough to enable the extensive establishment of complete technological systems combined with robots and assuring better competitiveness. At this point I want to point out that various regulators add to the installation costs of robots, especially with respect to the imposition of customs duties.

Purchases of robots and auxiliary technological equipment are liable to certain custom duties. These are relatively low on robots (at the time of writing 20 per cent). However, the purchase of robots usually forms part of the flexible automation of some process. Therefore, together with the robots, companies buy auxiliary technological equipment as well, and these latter fall under a higher customs rate. This higher rate (50 to 60 per cent) is then applied to the total price. The practice not only renders the purchase of robots difficult but also acts against the acquisition of complete technologies. Yet experience shows that only the robot's integration into complete systems provides for their effective, industrial-scale use. Yet this is accomplished only very rarely, partly because of the afore-mentioned reasons. Therefore, a more consistent customs regime is vital if the country's technological standards are to be increased.

Poor Operating Conditions, Outdated Support Industries

The programmability and adjustability of industrial robots render flexible manufacture possible. Yet to enable them to perform, they need a smooth supply of materials and parts and the so-called 'critical mass' must be achieved when they are introduced. The employment of robots exerts an impact on the work of designers, technologists, controllers and workers alike. One piece of equipment in this field and in these phases of work may cause more concern than ten, but it is the other way around with maintenance.

Another point is that the quality and continuity of the material supply depends largely on the production of the support industries. My experiences suggested that at present, our support industries are not well prepared for the re-processing of their products using industrial robots. For instance, there is a monopolistic situation in the production of various steel pipes and sheets and to a certain extent, this involves drawbacks for companies using their products, because it is hardly possible to force the manufacturers of these products to fulfil changing requirements. Production tolerances (such as dimensional accuracy of sheets, shape and form accuracy of steel profiles, dimension accuracy of the wall thickness of steel pipes) given by support industries which enjoy monopolistic positions, frequently impede re-processing by robots.

Over and above these points, there are contradictions hidden in the regulators which also hinder the efficient operation of robots.

There are many indications about that the industrial policy, including regulation, is still hesitating about what to support: the manufacture or application of robots, specialization or self-support. This has resulted in a situation in which Hungary is lagging behind even the medium-developed CMEA countries - both in manufacturing and employment. (There have been only vague attempts in manufacturing: the pneumatic manipulator by EIVRT is falling far behind world standards even in the

category of manipulators, and no more than a few pieces have been made of other types - without any results! Even now, only a few concepts - mainly ones concerning licence purchases - are generally known (Videoton, Rekar).

Nevertheless, sporadic individual realizations have been recorded in the field of application. In the industrialized countries, it was the vehicle industry, as a growth branch, that pressed ahead with the development and application of industrial robots. In Hungary the lack of a car industry, the different size of series and the lower innovation sensibility of road vehicle manufacturing have made the implementation of concentrated development impossible. For instance, the announcement of a centrally declared competition in 1986, devised to give an impetus to the application of robot technics in the same way as the introduction of CNC technics, was full of contradictions: it covered the introduction of socialist robots only. With regard to its implementation, companies found it disunited and inconsistent.

The third major feature concerning operating conditions involves the 'receptivity and capability' of labour. My experience suggests that this raised many problems for the companies, mainly in the first years. Robot technics embodied a thoroughly novel technology for technicians. It was they who, in the first place, had to work on and with robots. They had to stave off early troubles under the watchful eyes of would-be users. In many cases, those interested in the operation had, instead of helping, done everything in their power to hinder the operation; they failed to ensure the continuity of the parts supply, and sent parts prepared for the robot back to the simultaneously running manual production. The quality of preparation of the materials to be welded was not good enough for robot production, despite the fact that those directing the introduction of robots ordered the improvement of the necessary equipment and the increase of dimension accuracy well beforehand.

The preparation of materials of proper quality would have called for more careful work, more attention and to some extent for more time. Yet neither the workers nor the managers had a financial interest in these things. They did not want to change the quality of pre-products, and they were not worried about the cutting accuracy or tolerance of the pipes to be welded. Many managers held the view that robots were robots just because they could weld any parts in front of them, regardless of requirements or standards. In the beginning, they were not willing to accept any changes. There were welders who felt that robots doing the same work they had specialized in for years were there to take the bread out of their mouth, so they eyed robots - as well as their operators - with the greatest suspicion.

Within six to nine months after their installation, the robots 'already' worked well. The main problems hindering their application were a sluggish supply of raw materials and/or parts, the mechanical problems of fitting the robot and the machines connected to it, and the poor quality of many of the necessary raw materials.

Positive Changes Following the Introduction of Robots

Despite all the troubles and difficulties, companies reported positive changes - clearly due to the installation of robots. (Table 5)

As the data in Table 5 shows, the quality of products following the installation of robots showed a marked improvement at nearly all companies. Productivity also grew. As for the latter, Csepel RUGÉV reported that a single welding robot can weld, in a given time, three times as many bicycle parts as a traditional semi-automatic welding machine.

