THE EFFICIENCY OF REAL AND HUMAN RESOURCES IN HUNGARIAN INDUSTRY

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The author attributes economic growth in Hungary to three factors: structural change, increase of employment, and productivity. On the basis of this he points out that in the 1950's the first two factors were responsible for nearly half of the economic growth. From the 1960's this tendency has changed; more and more importance has been taken by the increase of productivity. As the main source of economic growth is the increase of industrial productivity, in the further part of the study the author makes an attempt to break down the development of Hungarian industry into its components and to analyse their efficiency. Starting from the present conditions of industrial development he investigates what further increase of industry the resources accumulated till now and their probable growth will allow in the future.

Taking into account the role of material and human resources the author draws the following conclusions.

Industrial production will increase in the future at the same rate as productivity.

The increase of industrial investment will probably be lessened, which postulates the greater increase of capital productivity as well as that productivity will increase at a higher rate than the capital-labour ratio.

These conclusions assume an increase in the efficiency of industrial investment and an above average increase in the high-productivity branches.

A further source of increasing productivity is accumulated human capital. The higher educational level is one of the guarantees for the ever-increasing role of productivity in economic growth in the future.

One of the well-known central issues of economic analysis is the explanation of economic growth or economic development. For economic research to have an active part in shaping economic policy it seems necessary to elaborate methods which help to determine the most efficient allocation of the increment in scarce resources. Consequently, efficiency analysis consists of presenting the individual factors of growth, their expected efficiency and contribution to economic growth.

The present study aims to show, on the basis of two decades of development and present conditions, the development perspectives of Hungarian industry as permitted by the accumulated resources and their expected increment.

At the present medium development level of the Hungarian economy, overall economic growth is fundamentally determined by industry, partly through an increasing share in the national economy and partly through a faster and steadier growth as compared, e.g., with agriculture.

In the present study, following international practice[1], economic growth (the increment in national income) is attributed to three factors: 1. structural changes, 2. employment, and 3. growth of (labour) productivity. The relative shares have been calculated by standardized productivity indicators assuming constant branch productivity (output per active earner).

[1] *Investment in Human Resources and Manpower Planning.* United Nations, New York, 1971.

TABLE 1

PERCENTAGE DISTRIBUTION OF ACTIVE EARNERS BY SECTORS

(Population census data)

	Industry and construction	Agriculture	Tertiary branches	Total
1930	21	54	25	100
1949	22	54	24	100
1960	34	39	27	100
1970	44	26	30	100

National income rose by two and a half times between 1950 and 1972 at an annual rate of around 6 percent. Some ten percent of this increment originated from the structural change which meant a considerable increase in the number and share of persons employed in industry, where the productivity level is higher, and a reverse trend in agriculture, where productivity level is comparatively lower. A further 20 percent of the increment was due to the increase in employment and around two-thirds to the growth of productivity.

However, there are considerable differences behind the averages of the two decades. In the fifties the increase in employment and the rapid structural changes explained almost half of the increment. The contribution of productivity to the growth of national income was somewhat more than fifty percent over the same period.

In the early sixties a change in this trend was observed. The contribution of structural changes and expanding employment diminished gradually, giving more room to the growth of productivity. This was true both for the early years of the decade and for the more recent ones. Over the last three years for example only some 3 percent of the national income growth may be explained by structural changes and only slightly more than 10 percent by the rise in employment. Consequently, 87 percent of the growth resulted from rising productivity.

A conclusion which is valid for almost every country is suggested by what has been said above: at a certain level of economic development, structural transformation and employment expansion have a great role in the growth process. However, this role is gradually taken over by rising productivity.

According to present plans and forecasts the main source of economic growth in the coming decades will also be the rise of productivity in Hungary. Since opportunities for increasing productivity are limited for the time being in agriculture and the tertiary branches, the main source of economic growth will also in the future be industry, in particular the rise of industrial productivity. By analyzing past development we are trying to determine to what extent Hungarian industry will be able to meet this requirement. An attempt will be made to point out the growth factors of Hungarian industry and analyze their efficiency.

1. STRUCTURAL CHANGES IN INDUSTRY

Our starting hypothesis is that industrial output, like overall economic growth, is a function of three factors: structural changes, rise in employment, and increased productivity.

The analysis of the development of Hungarian industry over the past two decades may perhaps be started by saying that fundamental changes have taken place over this period in the structure of industrial production. A great number of examples could be mentioned. If, however, one tries to find a summary measure of these structural changes and analyze their effect on the growth of industrial production, problems are encountered which make quantification extremely difficult.

The first problem is what can be regarded as the structure of industry. In this respect an infinite number of investigation opportunities present themselves depending on the boundaries of the branch structure. For instance, the branches may be as follows: mining, chemicals industry, engineering, etc., or they may be broken down more finely: e.g., within mining, coal, oil and bauxite, etc. mining. Coal mining could be presented in an even finer breakdown: mining of high, medium and low caloric value coal. Going on like that one would get to the individual commodity groups or commodities. The "ideal" structural analysis would perhaps base the investigations on the hundreds of individual commodities. This is obviously not feasible.

The second problem is the definition of industrial output. As is well-known, a number of definitions are available, from "gross" production covering the widest scope, to net incomes adjusted for subsidies. It should also be mentioned that, apart from the value indicators for measuring the volume of output, product series and other approximation methods may be used.

The third problem is that of prices. Due to a wide and intricate system of individual taxes and subsidies in our price system, the results by branch are not always the same as in the macro level calculations involving the simulation of world market prices. Output measured in terms of factor costs implies considerable netting of individual taxes and subsidies which affect prices.

Owing to differing definitions of output and differing prices applied, productivity weights obtained vary by branches. Using these weights, different results are arrived at for the effect of structural changes.

The results depend also on which year's productivity was taken as the basis for the calculations. Due to the different growth performances, relative productivity levels changed considerably, not to mention the effect of rising prices. In 1950, for example, the productivity level of mining was one and a half times the level of industry, and those of engineering and chemicals industry were much below it. Using the weights of 1950 the figure obtained for the effect of structural transformation is negative. In 1972 productivity in mining was around the average of industry and that of chemicals industry much above it. Productivity in engineering was close to the average level. Using the weights of 1972, about one tenth of output growth was explained by structural changes.

It may also be regarded as structural change if employment expansion is faster in branches where productivity growth exceeds the average regardless of the absolute level of output per head in these branches. This latter type of structural change constituted an important component of industrial growth, as shown in Table 2.

An attempt was also made to use output per head figures of some other countries as standard weights. However, weights differed so much by countries

TABLE 2

CHANGES IN PRODUCTIVITY DIFFERENTIALS IN INDUSTRY

(In 1968 prices)

	Net output per head as percentage of the average of industry			Employment in 1970 as percentage of 1950
	1950	1960	1970	
Mining	156	113	101	185
Electric energy industry	162	162	225	210
Metallurgy	112	131	124	183
Engineering	68	88	95	261
Construction	70	94	85	176
Chemicals	79	121	167	353
Light industry	111	92	81	279
Food processing industry	105	105	91	198

that we had to give it up. *Per capita* output figures calculated in national currencies deviated in the same direction for only three of the twelve countries. Productivity in the chemicals and electric energy industries exceed to smaller or larger extents the industry average in every observed country, and in the textile industry it is to a varying degree again below the average. Productivity in the rest of the branches fluctuated around the average in every country, showing no definite pattern.

Furthermore, there is also a type of structural change which results from a more-than-average growth of employment and productivity in large enterprises with higher productivity levels. In the nine large industrial enterprises accounting for some 20 percent of gross output, employment rose by 61 percent and productivity by 43 percent between 1968 and 1972. The corresponding average figures for employment and productivity in industry as a whole are 9 and 23 percent, respectively. The gross output per head of these 9 enterprises is more than twice the average of total industry.[2]

It is no coincidence that we have dwelt so long on problems of measuring the effect of structural changes. This was partly because most of these problems also influence the further calculations and analysis. However, the main reason was that the central issue of Hungarian industrial development is to create an efficient production structure. Hungary, as is well-known, has a rather open economy. It follows from this that the structure of production *could* and *should* be better adjusted to the requirements of the world market than in economies of less open character. A further consequence is that changes in the structure of production may become a major source of profitability and productivity (and finally of output) growth. It would be an obvious requirement that the effect of structural changes be adequately reflected by synthetic output figures. At present, however, as has already been mentioned, structural shifts towards higher efficiency are not always reflected in the aggregate figures of industrial output (and productivity).

[2] *On Large Enterprises.* Economic Research Institute, Budapest, 1973.

This is supported by an investigation carried out by the Hungarian Economic Research Institute concerning the structure of industrial production. Forty-five industries were ranked on the basis of eight different "efficiency" indicators.[3] When ranked by various indicators the individual branches fall in the same order only by coincidence. By way of example we present the ranks for each of the eight indicators for the branches which on the basis of productivity ranked 1st (oil mining), 19th (electrical engineering), and 45th (handicrafts).

TABLE 3

RANKING OF SELECTED BRANCHES BASED ON VARIOUS "EFFICIENCY" INDICATORS

	Oil mining	Electrical engineering	Handicrafts
1. Productivity	1	19	45
2. Capital intensity	27	25	1
3. Enterprise profitability	41	8	5
4. Total net income	1	7	27
5. Gross efficiency indicator	3	18	17
6. Net efficiency indicator in Forints	3	14	9
7. Net efficiency indicator in U.S. $	1	31	44
8. Net efficiency indicator in Rubles	2	12	45

Contents of Efficiency Indicators

1. Value added per employed (in Forints)
2. Value added per net asset and stock value (in Forints)
3. Profits relative to the sum of gross asset and stock value plus the wage bill multiplied by three (in Forints)
4. Total net income relative to net output
5. Value relative to net asset and stock value and wages and incomes (in Forints)
6. Net income relative to net asset and stock value and wages and incomes (in Forints)
7. Net income relative to net asset and stock value and wages and incomes (in U.S. $)
8. Net income relative to net asset and stock value and wages and incomes (in Rubles).

Even the best "efficiency" indicator cannot give a reliable answer which branch or productive activity should be expanded or restricted in order to increase efficiency. Our analysis so far has referred exclusively to the past. However, the trend of prospective development may be influenced by a number of such factors which may change in the future, e.g., the direction and rate of technological progress, prices, market conditions, etc. Therefore, it would not be reasonable to base decisions about structural changes in industry only on indicators of the past; the expected efficiency of individual investments in individual branches in the future should also be included. Under these conditions the discounted return on invested capital emerges as a decisive factor in the development trend of competitive branches. In other words the criterion is the economic efficiency of individual investments.

[3]Simán Miklós: Economic Efficiency and Structure of Industry. *Economic Review*, 1971. IX.

So far our attempts have been aimed at measuring the effect of structural changes. Our investigation boils down to saying that these changes contributed "considerably" to industrial growth. However, one cannot in fact speak of "pure" or "neutral" structural changes because they unavoidably imply investments and increasing skill of the labour employed. Consequently, even if the effect of structural changes could be quantified it must not be viewed independently of investments and growing labour force.

2. The Role of Increasing Employment and Productivity in the Growth of Industrial Output

The growth of industrial output will first be examined in terms of two factors: employment and productivity increase. Since industrial employment has not increased substantially in recent years, and the same trend is expected for the future, the effect of increasing employment will be discussed briefly. Our main concern here is to analyze productivity growth and the contributing factors.

Let us first look at the summary data.

Industrial output in Hungary has increased at an annual average rate of 8 percent over the past 22 years, reaching in 1972 a level five times higher than in 1950.

Here and further on output growth is characterized by net output figures: the indices are calculated in 1968 prices. Index numbers of industrial output (value added) do not deviate much from these figures since capital stock in industry developed similarly to output and in Hungary a linear depreciation system is applied in general.

During the same period industrial employment (workers, technical, and administrative personnel working full time) rose from 800,000 in 1950 to 1.8 million in 1972, that is to 225 percent. It means that on average employment increased at an annual rate of nearly 4 percent during the 22 years.

Calculated with the above data, productivity in industry rose during the 22 years almost proportionally with employment to 227 percent, on average at around 4 percent per annum.

Here and further on productivity is measured in terms of net output per employee. Calculated on the basis of man-hours performed the growth rate of productivity is 10 percent higher (4.4 percent at an annual average) because the number of weekly working hours diminished from 48 to 44 during 1968 and 1969.

TABLE 4

Summary Data on Industrial Growth

1950–72

	1972 as percentage of 1950	Average growth rate
Output	510	7.7
Employment	225	3.8
Productivity	227	3.8

From the above data it can easily be calculated that during the whole period investigated half of the output increment resulted from expanding employment and the other half from rising productivity.

In the first half of the period employment increased at about double the rate of productivity. Therefore, the contribution of expanding employment to output growth was about two thirds while that of productivity was about one third. From the early 1960's on this share has gradually reversed and over the most recent years the total output increment has resulted from increasing productivity with industrial employment practically unchanged.

However, accelerating productivity could not counterbalance the slower growth and later the stable level of industrial employment, and the average growth rate of industrial output diminished from 9 percent of 1950's to 7 percent in the 1960's and to 6 percent in the last years.

TABLE 5

CONTRIBUTION OF EMPLOYMENT AND PRODUCTIVITY TO THE GROWTH OF INDUSTRIAL OUTPUT 1950–72

	Employment	Productivity	Output
	Average annual growth rate		
1950–60	5.4	3.1	8.6
1960–70	2.9	4.1	7.1
1970–72	0.1	5.9	6.0
	Percentage distribution		
1950–60	64	36	100
1960–70	41	59	100
1970–72	1	99	100

A conclusion is usually drawn from this simplified relationship that there was a switch-over from the "extensive" phase of industrial growth to the "intensive" one. This latter is characterized, as is known, by the fact that the main source of output growth is increasing productivity. In what follows we will concentrate on opportunities for increasing productivity, i.e., on resources of growing output.

3. PRODUCTIVITY—CAPITAL SUPPLY

As is well-known, productivity growth is very closely connected with investment, the expansion of capital stock.

Fixed capital in industry rose to around five times its initial level over the 22 years, which means that the ratio of capital to labour increased at about the same rate as productivity. This relationship holds even if the period investigated is divided into two parts: productivity in Hungarian industry grew by and large parallel with the capital/labour ratio in each decade taken separately.

At first glance a rather strong correlation seems to exist between the growth of industrial capital stock and output growth: a 1 percent increase in industrial capital stock produces 1 percent increase in industrial output. This is equivalent to saying that a 1 percent increase in the capital/labour ratio is accompanied by a 1 percent increase in productivity.

TABLE 6

OUTPUT AND CAPITAL STOCK PER EMPLOYEE IN INDUSTRY

1950–70

	Productivity	Capital/labour ratio
1960 as percentage of 1950	135	137
1970 as percentage of 1960	150	150
1970 as percentage of 1950	202	205

From the above relationship the growth of output in Hungarian industry can be explained in terms of labour or capital "productivity" since the inverse capital/output ratio1/COR has been practically stable (fluctuating around 1) over the last decade.

From the above data the conclusion could easily be drawn that the precondition for the future growth of industrial output in Hungary at the rate of 6–7 percent would be the further expansion of fixed capital at 6–7 percent per annum. However, forecasts imply a slower growth rate for investment in industry. The upper limits of the growth rate of global investment are estimated by the plans as 5–6 percent annually. The share of investment in industry should decrease somewhat in favour of construction and infrastructural (e.g., road and housing construction) investments. (This development trend is supported—although not conclusively—also by international data.) Under these conditions the requirement should be stipulated for industrial investments that they increase productivity to an even greater extent.

Now the question is: what possibilities are there to achieve this?

Unfortunately there is relatively little international data on the relationship between productivity and the capital/labour ratio in industry. In U.K. industry, in order to increase productivity by an annual 2.4 percent the ratio of capital per employee had to be increased by 3.8 percent annually between 1960 and 1970. (Changes in capital stock are calculated on the basis of replacement costs.) In American industry, output per employee rose by around 3 percent and the capital/labour ratio rose by 2 percent annually between 1960 and 1970 (based on the net capital stock).

Although no conclusive evidence can be obtained from the international data for the increasing trend in the "productivity" of industrial capital (decrease in the capital/output ratio), in our opinion, the productivity increasing effects of investment in Hungarian industry are expected to be greater in the next five to ten years. This conclusion is supported partly by the fact that in general those industries are capable of growing faster than the average in the future which increase productivity faster than the capital/labour ratio, e.g. engineering and chemicals industry. Where investments produce slower productivity increase a slower growth of output is envisaged, e.g., in mining and light industry.

All these simplified relationships, however, are in fact much more complicated. It would be an easy task to concentrate investment funds available to the whole industry on the development in branches which would step up productivity

TABLE 7

OUTPUT PER EMPLOYEE AND THE CAPITAL/LABOUR RATIO BY MAJOR INDUSTRIES

1960–70

	Output per head	Capital/labour ratio
	1970 as percentage of 1960	
Mining	131	179
Electrical energy industry	174	190
Metallurgy	153	175
Engineering	154	134
Construction material industry	131	179
Chemicals industry	205	174
Light industry	127	150
Food processing industry	156	120
Total	150	150

at a rather high rate. Similarly employment could also be concentrated in branches where the productivity-increasing effect of investments is the highest. Apart from quantifiable efficiency factors investment decisions are motivated by a number of other factors. It is a generally accepted fact that those industries should also be expanded the products of which have limited import opportunities or which cannot be imported profitably if at all. Such are for example electric energy and most of construction materials. Further, it may also be the case that there are products within the industry the import of which incurs losses. Consequently we are left with a rather small investment fund which finally can be allocated exclusively on the basis of efficiency.

Investigations comparing the structural efficiency of Hungarian industry with that of some other countries point out that production is more concentrated in the more efficient branches in these countries than in Hungary.

This investigation was based on the input-output tables of the Netherlands, France, Belgium and Italy. "Efficiency" indicators were calculated from the available data. Then industries were ordered by the values obtained for incomes per unit wage and depreciation allowance. The analysis showed that in these countries 30–40 percent of production was concentrated in branches where efficiency was above the average. The same figure for Hungarian industry varies around 10–15 percent (calculations were carried out in both domestic and world market prices).[4]

These calculations suggest that despite the "limiting factors" there are considerable efficiency reserves in Hungarian industry. Reference has already been made to the fact that the various efficiency indicators do not necessarily coincide with the usual summary indicators of economic growth (aggregate indices of production and productivity). Nevertheless our opinion is that concentrated development decisions based on efficiency calculations finally increase the macroeconomic productivity of labour and the volume of commodities available for consumption.

[4] *Efficiency in the Economy*. Economic Research Institute, Budapest, 1971.

Increasing efficiency is indicated perhaps also by the greater role of large scale enterprises which, by taking an active part in the organized division of labour, are making extensive use of the economies of scale.

It is a logical consequence of the exposition above that technical progress achieved through investment is an important source of productivity increase. As has already been mentioned the first ("extensive") stage of our industrial development was characterized by a rapid expansion of employment. Investment activity first aimed at creating new employment opportunities. Apart from this, however, the secondary aim was to increase productivity since new investments did not simply embody the old technology. The second ("intensive") stage of development was characterized by investment increasing efficiency and representing higher levels of technology. If the contribution of technical progress to economic growth were quantified it is highly probable that its share would be increasing from 1950 on more or less in line with productivity.

This is proved by a considerable expansion of research and development activity. The number of persons engaged in research and development doubled over the last ten years: it increased from about 35 thousand in 1960 to 73 thousand in 1972. Their share in total employment is at present one and a half percent. Total expenditure on research and development (including investment) increased to three times its initial level; it amounts to around 4 percent of the national income.

More than half of persons engaged in research and development and connected expenditures serve industrial development purposes. More than three quarters of industrial research is concentrated in two branches: engineering and the chemical industry.

Naturally there have been sources of increasing productivity (and output) which are not necessarily connected with technical progress. Here we have in mind among others the mechanism and organization of industrial management. For example, following the introduction of planning and nationalization between 1946 and 1948 productivity in industry increased at the annual rate of 15–20 percent. (This result of course was also influenced by the fact that it took place in the reconstruction period.) There was also an acceleration in productivity growth after the new economic management system was introduced in 1968: output per man-hour increased by 4.5 percent per annum between 1961 and 1968 but at 6.7 percent between 1968 and 1972. (To ensure comparability output per man-hour was used because of a reduction in working time in the latter period.)

No doubt the level of internal organization, management, marketing and research and development activity in the enterprise have a considerable role in the growth of productivity. In fact, however, the management mechanism of industry and the economic activity of the enterprise cannot be clearly separated. The role of institutional factors consists just of promoting the more efficient work of the enterprises. For example, the new management system of industry introduced in Hungary envisages the creation of a reasonable order of enterprise economic activity. This, however, presupposes the introduction and application of "new technology", and modern systems and machines of production control, for example of computers.

The conditions of Hungarian industrial development for the future discussed above by way of examples suggest that the increasing scarcity of labour resources will force a higher rate of technical progress in order to increase productivity.

4. Qualification—Training

Our analysis has been concerned so far primarily with the effect of investment in fixed capital, increases in the capital/labour ratio and technical progress on industrial output. Next we are going to investigate the role of labour in industrial growth.

It is a well-known relationship that there is a strong correlation between the qualification of labour and the level of economic development. (The correlation coefficient found between the indicators of highly qualified experts in engineering per 10,000 persons employed and the *per capita* national income in case of 16 countries was: $r = 0.867$.)[5] One of the greatest Hungarian politicians of his historical age, István Széchenyi, also claimed a good hundred years ago that the power of a country is indicated by "a great number of qualified brains".

In Hungary the qualification level increased steeply after the liberation.

TABLE 8

Development of Educational Level

	Graduates from the		
	I	II	III
	educational levels as percentage of the corresponding age groups		
1930	12.9	—	1.7
1949	20.5	5.5	1.7
1960	32.8	8.8	2.7
1970	51.7	15.6	4.3

Note: Educational level I: Persons graduated at least from the 8th class of primary schools
Educational level II: Persons with at least maturity certificate
Educational level III: Persons with certificates of higher level educational establishments.
According to the levels of the UNESCO recommendation.

There are various methods available for a time and international comparison of the average educational level. Of these that method seems most reasonable which derives the educational level from the international general qualification expenditure proportions (UNESCO recommendation). According to this the average educational level in Hungary increased 2.2 times over the past 20 years. The realized level and growth rate of education in Hungary may be said to be rather high in international comparison. Despite difficulties concerning international comparisons it can be pointed out that the productivity level and growth are not proportional to education. At first glance the conclusion may be drawn that in Hungary the efficiency of investment in "human capital" has been—at least

[5]Dr. Olajos Árpád: Qualification Level and Structure, *Statistical Review*, 1973. V.

so far—rather low. The effect of expenditures on education can be measured with a rather long time lag. The length of this lag, however, encounters almost insolvable difficulties. So much is certain, however, that human capital accumulated earlier is a precondition of rising productivity in the future.

The number and share of enrollments has not increased lately. In spite of this, however, the average educational level increases automatically because the younger generations have higher educational levels than the older ones.

Persons 25–29 years old with respective educational levels as percentage of the corresponding age groups in 1970 were as follows: educational level I, 82.6 percent as against the average 51.7 percent; educational level II, 25.8 percent as against the average 15.6 percent; educational level III, 7.4 percent as against the average 4.3 percent.

Relatively detailed data on educational expenditures and investment are available from the national accounts from 1960 on. Public current and capital expenditures on education increased from 6 billion Forints to nearly 15 billion Forints over the past ten years, with their share in GDP rising from 3.4 percent to around 4 percent. In addition, private family expenditures on education increased by some one third of the public education expenditures, which does not alter very much the increase in educational expenses and their share in GDP.

To calculate, however, to what extent total current and capital expenditures contributed to the growth of industry is practically impossible. The much faster than average rise in the number of persons with certificates in engineering serves as an indication that the expenditures rose at a higher than average rate just in order to promote industrial development. A sample survey showed that between 1963 and 1971 the number of employees with high and medium level qualification increased 64 percent in the national economy as a whole and by around 90 percent in industry.

All these suggest the conclusion that a considerable productivity reserve in human capital has accumulated in industry over the past twenty years. The average qualification level of persons employed in industry, measured by the above mentioned method, has increased to nearly three times during the same period.

These calculations exclude the rising skill level of physical workers. Detailed data on this again cover only the last ten years. They indicate a gradual increase of the skill level of industrial workers. Between 1960 and 1970 the number of industrial workers rose by 25 percent, of which the number of skilled workers rose by 32 percent, pushing their share in total industrial employment from 78 percent in 1960 to 82 percent in 1970.

Analyzing the skill level of physical workers alone one could say that it is extremely efficient since the 32 percent increase in the number of physical workers was accompanied by around a twofold rise in industrial output. It is highly probable, however, that the relationship between the skill level of physical workers and productivity growth in Hungary is such that a one percent growth of productivity is associated with a one third of one percent increase in the number of skilled workers. This is contrary to the role of intellectuals in which case one percent productivity growth was most probably accompanied with at least an identical or greater increase in the number of these employed.

The relatively moderate average rise in the number of skilled workers implies, however, well above the average growth rates for a few key professions. In the main engineering professions the number of persons employed in 1970 was twice that of 10 years before. It follows from this that there are "dying" professions where employment increases but slightly, or it diminishes in some cases (e.g. miner, smith, shoemaker, etc.). Here again the problem facing us is that the summary averaged figures give only slight indication of changes taking place in the structure of professions. Wage rates are in general higher in professions which are of primary importance for industrial development than in the "dying" professions. If the structure of professions were standardized using present wage rates it is highly probable that the growth rate obtained for the skill level of industrial workers would be much higher than 32 percent in respect of the ten years mentioned.

Finally in connection with the "human" sources of productivity growth it has to be mentioned that experience, routine and the length of time spent in production have an especially great importance in Hungarian industry. Industry is the "youngest" branch in the Hungarian national economy. The average length of employment of physical workers here was a little less than 14 years. About one quarter of the workers has been employed for less than five years. The majority of workers, the number of which nearly doubled during the twenty years, had practically no industrial or professional skill. In the fifties and even in the early sixties about half of the skilled workers obtained professional qualification through training at the plants.

Since the performance (productivity) of workers is closely related to their earnings the assumption seems acceptable that the productivity of individual workers increases proportionally with their earnings. In 1964 and also in 1969 workers reached the average hourly wage rate after more than 10 years of experience. It follows from this that the average productivity level is attained only after about 10 years of industrial practice. In 1969 40 percent of workers had shorter employment than ten years in industry. Increasing the productivity of these workers up to the average level alone is a considerable reserve for raising industrial productivity.

The following main summary conclusions may be drawn from the analysis of Hungarian industrial performance, and within this of the roles of human and material resources.

—Industrial output will grow in the future almost parallel with productivity (output/labour).

—Productivity in industry has developed so far with the capital/labour ratio. As for the future, industrial investments are likely to decelerate slightly which assumes an accelerated increase in capital "productivity" (output/capital) on the one hand and labour productivity growing faster than the capital/labour ratio ($O/L > K/L$) on the other.

—These assumptions are based on the expectation that the efficiency of investments will grow by itself and also that output will rise at higher than the average rate in those branches and enterprises where the level and growth rate of productivity are above the average.

—A further source of increasing productivity is the accumulated human capital which had served earlier partly as "substitute" for scarce investment resources.

The further development and complete realization of the new system of economic management and control, which promotes individual initiative and at the same time forces enterprises toward a rational and efficient activity, makes it probable that all the above conditions will ultimately lead to the desired result, i.e., to industrial output rising steadily in the future at a rate around 6–7 percent.

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