Chapter III

INDUSTRIALIZATION: MARXIST IDEOLOGY OR ECONOMIC COMPULSIONS?
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A striking feature of Russian/Soviet economic development was the lead of industry, particularly heavy industry. From the time of Peter the Great to the end of the Stalinist era, rapid industrialization was regarded as synonymous with economic progress and prosperity. The main features that distinguished the strategy of industrial development in Russia before and after the Revolution of 1917 can be summarized as follows: (1) A very high rate of investment in industry was maintained because of the Government's inclination to discount the future at a low rate. (2) Industry was treated as the leading sector in the development process. Investment in agriculture was kept down to the minimum possible. (3) Contrary to all well-established views on the subject, a balanced industrial growth pattern was adopted, allocating a very large share of industrial investment to those industries which were mutually interdependent from the technological viewpoint. Here we have used the concept of balanced growth in the Rosenstein-Rodan sense to refer to the minimum size of the investment programme required to start economic development. We shall discuss it in detail later. (4) Strong preference was shown for the construction of well-integrated, large-scale plants, specialized with respect to

product and having a high fixed-cost to variable-cost ratio. (5) The most advanced technology was chosen from among the various alternative productive techniques that were available. At the same time a well-sustained attempt was made to economize on the use of scarce inputs. A dual technology was adopted. That is, advanced technology with a high capital-labour ratio was favoured in the basic production processes, and technology with a low capital-labour ratio was favoured in the auxiliary and subsidiary processes. (6) And, finally, a policy entailing a high degree of import substitution or autarky was adopted.

The emergence of certain immediate military compulsions exerted a strong, independent influence on the strategy of economic growth adopted in Russia/the Soviet Union. Industrial development is an imperative for military enterprise. From the military point of view, it was necessary for the country not only to develop its economy faster but also to enable it to withstand the conditions of war. This meant that the economy should achieve self-sufficiency in the quickest possible time. It was also necessary to develop the capital-goods industry fast, for armament production depended upon it. If the Government had invested in agriculture and waited for the demand effects to stimulate industry, the transmission of consumer demand would have encouraged only the consumer-goods industry and the foundation of it. Since, however, the prime mover was military necessity, it was necessary to develop industries such as the machine-building industry; and this necessarily introduced a bias in favour of industry in economic development.
Of course, even if there had not been any military compulsions in Russia/the Soviet Union, a similar strategy of economic development might have been dictated by the need for market expansion in the context of the conditions of poverty and population pressure and the closed economic system.

**Economies of Scale**

The preferential development of industry in the growth process follows from the logic of autarky, i.e. from Engel's Law about higher income-elasticity of demand for manufactures. That demand expansion should take place in the first instance in industry rather than in agriculture was partly a consequence of the mechanics of governmental demand expansion — of the fact that the Government was unable to create demand directly for food or consumer goods. It was also, and more importantly, a reflection of the basic differences in the production functions of industry and agriculture and the implications of those differences for a realization of economies of scale to augment growth rates in a backward country.

In making a comparison between industry and agriculture it is necessary to consider some aspects of the micro-economic theory of firm and the different nature of production functions in the two sectors. At the risk of oversimplification, we may point out here that, whatever may be the case for widening the market to capture economies of scale in industry, it is not applicable to agriculture. Theoretically the concept of economies of scale is the same for all firms, whether in agriculture
or in industry. Economies of scale lead to a reduction in total cost per unit of output either because of a change in the quantity of input or because of a change in the volume of output.

In the short run, economies may result from a fuller utilization of an existing plant; in the long run, economies result from the efficiencies arising from changing the size of a firm. In the short run, one or more of the resources in the production function is fixed. With an increase in production, fixed costs are spread over an increasing number of units of output so that the average cost per unit of output falls. In the long run, when the size of a plant can be varied, fixed costs become variable costs. Under given assumptions as to techniques of production, the costs of input, and the price of output, the long-range cost curve indicates the average total cost of production of firms of different sizes.

When the Government expands demand in the industry, there arise opportunities for exploiting cost-reducing techniques of production. These techniques would not be feasible if output is geared to supplying a small or "suboptimal" market. Often techno-economic requirements make large-scale production a sine qua non for low-cost production. Such requirements arise because the production function in a given industry is based on rigid factor proportions with large, fixed, high-cost input that is usually indivisible. Consequently, unless the output is large enough, the unit cost of production will be high. In some industries, both average and marginal costs of production fall sharply only when the plants approach capacity with a large output. For
the unit cost to drop in these industries, it is not enough if output is just large: it should be adequate to make the plant operate close to capacity. The size of the market thus becomes a paramount consideration in obtaining economies of scale.

There are many classic examples to illustrate the effects of increased size of operations on unit cost of production. We may cite two important examples here from ECLA studies. An increase in the capacity of a steel mill from 100,000 tons a year to 1.5 million tons a year is estimated to reduce the unit cost of production of pig-iron from $55 per ton to $40 per ton; that of steel ingot, from $95 per ton to $65 per ton; and that of the flat-rolled product, from $235 per ton to $121 per ton. Again, an expansion of the capacity of a paper pulp industry from 50 tons of paper pulp to 250 tons a day reduces the unit cost of production per metric ton of paper pulp from about $250 to $150.

In general terms, economies of scale apply more to heavy industries than to light industries. In the textile industry, for example, size of plant can be expanded or contracted as demand warrants. This is feasible because of the flexibility in factor proportions, the divisibility of inputs, and the discrete nature of the inputs. For example, spindles can be added or removed, and so can labour. Economies of scale are

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3 ECLA, Economies of Scale in the Textile Industry (Santiago de Chile, 1962).
generally greatest in capital-intensive industries; there are special savings in capital costs, supervision, and maintenance when operations are undertaken on a large scale. However, the basic factor that enables an industry to capture economies of scale is the presence of certain specific properties in the production function for low-cost output; these properties include a substantial "fixed" or "lumpy" input, and a large enough production run so that the costs of this fixed input can be spread over a large number of units of output.

The production function in agriculture is different from that of industry. Hence it lacks economies of scale. Agriculture depends on biological growth processes. Agricultural production depends on a large number of exogenous variables that are difficult to control. It has to contend with the variations of season and with local differences in humidity and/or temperature of soil, which can be substantial even within small areas. Agriculture is of necessity much more widely dispersed. All these require managerial supervision and call for initiative on the part of workers at the local level. Agricultural production thus makes it necessary for decentralized and continuous managerial decision-making power to be brought into play at the local level. These factors give rise to diseconomies of scale in agriculture.

Another reason for the unimportance of economies of scale in agriculture is that agricultural operations are inseparable

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from the operation of natural factors. Indeed these factors dominate agricultural production. An intensification of agricultural activity means diminishing returns. Any spatial extension of agricultural activity increases the unit cost of transport. For these reasons there are no substantial economies of scale in agriculture. Any injection of demand in the agricultural sector, therefore, would not lead to economies of scale that would facilitate an expansion of production at the prevailing prices. Whenever a new injection of demand occurs in the agricultural sector, the multiplier effect is damped by rising prices of food, as also of the raw materials required by industry.

If we have an institutional structure like the market economy (as in Russia before the Revolution of 1917 and in the Soviet Union in the twenties), price is an important factor. Because of lack of economies of scale, development through the agricultural sector is an extremely slow process. One of the sources of increased productivity which can be tapped by an injection of demand is thus not available. On the other hand, an expansion of demand in industry makes it possible to introduce innovation even where it has not been attempted before for fear of prices getting depressed on account of inelastic sales curves facing the industrial producer in an underdeveloped country. In agriculture, because of its atomistic nature, each producer expects to sell as much as he can, and he is ever ready to employ all possible innovations at the prevailing prices without worrying too much about the prospect of prices getting
depressed. Hence there are no unused innovations available in agriculture.

The effect of any newly injected agricultural demand is not primarily an increase in income but a distribution of income through better terms of trade for agriculture. An injection of demand in the agricultural sector, therefore, does not immediately release expansionary forces. On the other hand, it might result in a rise in the prices of agricultural products that would swamp the beneficial effects. Although there may be some stimulation in the first instance, the higher prices forestall any further favourable repercussions. Indeed they stop the chain reaction. This is not so in industry. It is only in the long run that research induced by higher agrarian prices bears fruit in innovations that add substantially to agricultural productivity. As a development strategy, therefore, it is slower and politically less acceptable than an increase in industrial demand.

Technological External Economies in Agriculture

In the context of our discussion here on whether it is wiser to inject demand in the first instance in agriculture or in industry, we might usefully consider the possible dynamic effects of widening the market in the industrial sector and to contrast them with the possible effects in the agricultural sector. If economies of scale are important, and the creation of the market encourages large-scale investment in industry, it should have a cumulative effect on growth. The first effect
will be through technological external economies, or economies that are external to the new industries. For example, where a new industry is large enough, it will have its own research facilities. This will provide benefits to the industry as a whole and to the economy through increasing the knowledge that is available. In addition, if the industry concerned provides new products, their dissemination may have a modernizing effect on some parts of the economy through incorporation of advanced technology in those products. The new industry also trains the personnel needed to fulfil its various skill requirements. In due course these skills would become available outside the industry at no direct cost to the economy.

Whatever the case for external technological economies through large-scale investment in industry, they seldom apply to agriculture. Since agriculture consists primarily of small-scale production units, few firms in agriculture can undertake research or develop new techniques of production. In addition, there is little in the way of in-house training on farms that benefit the industry as a whole or the economy at large. This situation is not likely to change even if there is a bigger market. Training, research, and application of research in the agricultural sector are the functions of national, State, or semi-State entities and will remain so. The Government can increase its activity in these areas regardless of the size of the market. This means that external technological economies are generated outside the farm firm. They do not depend on
market creation or expansion.

**Pecuniary External Economies in Agriculture**

There is a second kind of external economies which is pecuniary in character. Very briefly, large-scale investment in industry, such as investment in a steel plant or a petrochemical complex, made possible by a wider market, is expected to have a cumulative effect on growth. The new industry would create opportunities for added investment by firms which supply goods and services to the market created by the new industry. At the same time, the output of the new industry would serve as low-cost input for other industries. This in its turn would encourage investment in those industries.

There is little direct forward linkage within the agricultural sector. The output of one production unit is seldom an input in another production unit in the agricultural sector (except seed production). In terms of direct forward linkage with other sectors, a lowering of costs in the agricultural sector does to some extent contribute to a lowering of costs in industry. This might help in the industrial processing of agricultural products. The processing industry, however, may have to be large so as to capture economies of scale, but the resource base within the country may not be able to provide an adequate supply of low-cost input.

There is a large amount of direct backward linkage between industry and agriculture, and it is this backward linkage that is significant in considering the effects of any demand
expansion on increasing investment and technological change in agriculture. Output from many industries represents the purchased inputs in agricultural production. However, in so far as agricultural production is automatic in nature, and the prices are given exogenously, it means that the producer has already made use of all the profitable innovations at the prevailing prices. It also means that there is little likelihood of there being any unused innovations in agriculture at the prevailing prices. If attempts are made to raise the agricultural prices by injecting an additional demand into the agricultural sector, the beneficial effect on industry is swamped by the rising prices of raw materials and foodstuffs. Since there are no economies of scale in agriculture, and there is also the likelihood of unused innovations being available at the prevailing prices, there is no stimulation for industrial development. A rise in agricultural prices may at first stimulate industrial development, but the higher prices would forestall all possible favourable repercussions. The chain reaction would stop there of itself.

Thus, the differences in the nature of inputs between agriculture and industry indicate the lack of a prima facie case for the view that an expansion of market would provide opportunities for capturing economies of scale in agricultural production. Widening the market would not by itself encourage increased investment in agriculture for the purpose of capturing economies in farm operations.
STRATEGIES OF ATTACK ON MARKET PROBLEM

The bias in favour of industry characterizing the strategy of economic growth used in Russia/the Soviet Union was essentially the result of a number of strategies devised to attack the market problem. It was to an extent influenced by the population pressure as well. The strategies adopted by the Russian/Soviet Government to attack the market problem over a period of time falls basically into the following important categories.

Expansion of Army

First there is the huge expenditure of the Government on the upkeep and strengthening of its large standing army. Towards the end of the nineteenth century, military expenditure accounted for one-third of the total expenditure of the Government. In 1899 the budget expenditure amounted to nearly 1,500 million roubles. One-third of this, i.e. 500 million roubles, went to the Ministry of War and Navy and to the Ministry of Internal Affairs. We do not have before us here reliable figures relating

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| TABLE |
|-----------------|---|
| **TSARIST RUSSIA: GOVERNMENT EXPENDITURE, 1909-1913** | **(In Thousand Million Roubles)** |
| 1. Direct military expenditure | 3.3 |
| 2. Upkeep of the State apparatus, the Tsarist Court, and the Department of Religious Affairs | 2.9 |
| 3. Cost of the National Debt | 2.0 |

(footnote contd.)
to military expenditure incurred during the Soviet period, and yet we can clearly see on the basis of such estimates as are available that military expenditure was substantial. True, the strengthening and maintenance of a large standing army was the outcome of a complex set of political, economic, and military

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4. Current outlays on the railways, post and telegraphs, overhead costs of the alcohol trade, and economic Departments 4.6

5. National education 0.5

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TABLE

SOVIET UNION: BUDGET - STATE AND LOCAL (In Millions of Roubles)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Economy</th>
<th>Social and cultural</th>
<th>Education</th>
<th>Defence and administration</th>
<th>Expenses of State loans</th>
</tr>
</thead>
<tbody>
<tr>
<td>1928/29</td>
<td>8,023.8</td>
<td>4,112.1</td>
<td>1,495.9</td>
<td>1,085.4</td>
<td>1,588.1</td>
<td>317.5</td>
</tr>
<tr>
<td>1929/30</td>
<td>12,609.4</td>
<td>7,087.4</td>
<td>2,207.4</td>
<td>1,678.4</td>
<td>1,871.4</td>
<td>405.7</td>
</tr>
<tr>
<td>1931</td>
<td>23,367.1</td>
<td>16,506.8</td>
<td>3,373.8</td>
<td>2,709.8</td>
<td>2,398.2</td>
<td>408.3</td>
</tr>
<tr>
<td>1932</td>
<td>34,401.6</td>
<td>24,781.6</td>
<td>4,577.4</td>
<td>3,683.6</td>
<td>2,838.3</td>
<td>961.8</td>
</tr>
<tr>
<td>1933</td>
<td>39,904.6</td>
<td>26,710.6</td>
<td>5,840.0</td>
<td>4,725.0</td>
<td>3,370.8</td>
<td>1,436.7</td>
</tr>
<tr>
<td>1934</td>
<td>52,398.0</td>
<td>32,257.1</td>
<td>8,146.8</td>
<td>6,161.0</td>
<td>8,094.2</td>
<td>2,050.9</td>
</tr>
<tr>
<td>1938</td>
<td>123,996.0</td>
<td>51,709.0</td>
<td>33,316.0</td>
<td>18,774.0</td>
<td>32,773</td>
<td>1,955.0</td>
</tr>
</tbody>
</table>

Sources: Sots. Stroi SSSR (Moscow), 1936, p. 663; and Sots. Stroi, Sovyuza SSR (Moscow), 1933-38, p. 111, for the figures for the year 1938.
factors. In any case the expansion of the armed forces provided opportunities for investment via an expansion of the market or absorption capacity.

Fiscal Support

Investment was sustained, among other things, through direct fiscal support and direct control. The Tsarist Government adopted a rich variety of measures such as tax concessions, large-scale subsidies, high tariffs, supply of capital without interest, and long-term orders to domestic industry to stimulate industrial development. Supply of capital without interest, large-scale subsidies, autarky, etc. were also some of the principal characteristic features of Soviet planning. These distortions in resources allocation were aimed at raising the rate of return in the interest of accumulation.

7 Japan's early development is perhaps an outstanding example of a case where entire industrial complexes were created by the Government by purchasing the goods necessary to build up military establishments together with the military and civilian infrastructures needed to support them. Ushisaburo Kobayashi, Military Industries of Japan (New York, 1922).

8 Olga Crisp, Studies in the Russian Economy before 1914 (London, 1976), pp. 95-97. A Soviet economic historian, I.F. Gindin, points out that the success of John Hughes South Russia Company, incorporated in 1869, is frequently mentioned to show that autonomous development was possible in the industrial field in Russia. Whatever may be the expertise of Hughes, it must be remembered that he enjoyed privileges, assistance, and subsidies unthinkable in his home environment. His success would have remained isolated or short-lived had it not been for the huge railway development programme and the tariffs. See I.F. Gindin, Gosudarstvenny Bank i Ekonomicheskaja Politika Tarskogo Pravitelstva (Moscow, 1960), pp. 191-299.
Demand Creation at Strategic Points

Another effective way was injection of Government demand at strategic points of the economy. Transport and other social overheads were important in this context. In relation to the improvement of productivity, there is yet another approach to economic growth, viz that of building up the economic infrastructure. Here investment in transport facilities is the method used to create new markets. Absence of the market in an underdeveloped country is not just a question of the specific economic framework and institutions in which the incomes are earned. If division of labour depends on the extent of the market, the market in turn depends on the extent to which certain facilities are available. Transport is the most obvious of these facilities.

In the growth process of Russia during the second half of the nineteenth century, investment in railroad development occupied a crucial position in the Government strategy of creating a domestic market for manufactures. Sergei Witte adopted a strategy of growth based on a rudimentary theory of economic development. This strategy envisaged the development of heavy industries and their subsidiaries through extensive railroad construction so that Russia might have a capital-goods industry of its own. The expansion of heavy industries in its turn was to stimulate the growth of consumer-goods industries, and

eventually agriculture was to improve through increased demand for food and cheaper supply of superior equipment and chemicals. Tsarist economy policy under Witte also sought to promote, albeit in haphazard fashion, a balanced growth of the Rosenstein-Rodan type through co-ordination of investments in related industries. There was a massive concentration of Government investment in railroad construction as can be seen from the following table:

<table>
<thead>
<tr>
<th>Period</th>
<th>Construction of railroad (in verst)</th>
<th>Annual growth (in terms of Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1882-86</td>
<td>4,039</td>
<td>18.7</td>
</tr>
<tr>
<td>1887-91</td>
<td>3,227</td>
<td>12.6</td>
</tr>
<tr>
<td>1892-96</td>
<td>3,370</td>
<td>29.1</td>
</tr>
<tr>
<td>1897-1901</td>
<td>14,758</td>
<td>39.7</td>
</tr>
<tr>
<td>1902-6</td>
<td>6,348</td>
<td>12.2</td>
</tr>
<tr>
<td>1907-11</td>
<td>3,399</td>
<td>5.8</td>
</tr>
</tbody>
</table>


Given the production function of the transport industry, the backward linkages of the railway industry created a huge and expanding market for several industrial products like iron and steel, coal, oil, machine-building, cement, etc. Its forward

linkages enlarged the market for the products of light industries such as textiles, sugar, and food products. Besides, by lowering the cost of production and widening the physical extent and size of the market for industrial products, the massive railroad construction induced large-scale investment in industrial development of both domestic and foreign capital.

The Russian metallurgical industry was able to make decisive progress on account of the demand for its products from the railways. During 1890-1900, the railways absorbed 800-1,000 locomotives, 20,000-25,000 freight cars, 1,000-1,300 passenger cars, and 20-22 million poods of rail. The demand from the railways for pig-iron was, on an average, 40 million poods a year. The entire domestic iron and steel industry smelted a total of 55 million poods of pig-iron in 1880 and 65 million poods in 1895. It has been estimated that during the decade 1891-1900 the railways, along with the metallurgical and metal-processing industries, absorbed 70 to 75 per cent of the total production of ferrous metal. The coal and petroleum industries were similarly stimulated by the growing demand from railroad development. The Donets coal industry during the closing years of the nineteenth century sold 36 per cent of its output to the transport industry, 29 per cent to metal plants, and only 25 per

12 Ibid., p. 508.
13 Ibid., p. 509.
cent to private consumers. The market for the oil industry was mainly provided by the railways and the large-scale industries. The Russian petroleum industry increasingly became a mazut or railroad industry.

The impact of railroad development on the integration of the domestic market cannot be overemphasized. In expounding his celebrated thesis that division of labour was limited by the extent of the market, Adam Smith seems to have been concerned mainly with the geographical area of the market and concentrated almost exclusively on the benefits of cheap transport. Nurkse showed how Smith's emphasis on physical area and cheap transport had led to confusion although he conceded that, with a given population density and productivity per head, improvements in transport would increase the physical extent of the market, as well as its economic size, and conduce to economic development.

In the context of Russia prior to the Revolution of 1917, therefore, the size of the market should be viewed not only in terms of output but also in terms of physical area and cost of transport. In the pre-railroad era there existed very small, almost insignificant, local markets in Russia. Writing in the mid nineteenth century Tengoborsky pointed to the existence of high inter-provincial price differentials and large fluctuations in grain prices not only from province to province but also from area to area within each province and blamed it on the expensive and slow transport system. The large-scale railroad development

14 Ibid., p. 500.
brought about a quick integration and evolution of the national market.

Another writer has shown recently how the reduction in transport costs associated with the major railroad construction made a decisive impact on the quality of inter-regional trade in European Russia. Reduction in transport costs played a major role in improving the inter-regional terms of trade. This was demonstrated by the reduction in grain price differentials as between regions. About 83 per cent of the decline in the price differentials could be attributed to the decline in transport costs induced by the massive railroad construction. This integration of market was accomplished by a continuous rising share of marketed output. One can visualize how the railways must have made a similar impact on the market for industrial products as well.

Co-ordination through Planning

The method adopted in Russia following the Revolution of 1917 to solve the difficult market problem was direct or centralized planning. It was a most effective method inasmuch as it enabled the Government to achieve a remarkable degree of concentration and co-ordination of investment activity. Under the centralized planning system, the planners concentrate on certain technologically related key commodities/branches or "decisive links." The method of "material balances" - a crude

input-output process - is used to reconcile supply and demand for these commodities.

**Balanced Growth Strategy**

It may be hypothesized here that, contrary to popular belief, the Soviet Government also adopted, and in a systematic manner, a balanced growth strategy to break the "vicious circle" on the demand side. Indeed the strategy of industrial investment adopted by the Soviets may well be described as a classical historical example of the balanced growth strategy advocated by economists like Nurkse.

The concept of balanced growth is used here, as pointed out earlier, in its technical sense. "It refers to the balance between the size of markets, the volume of supply, and the demand for capital. It is the same balance as that which concerned Adam Smith, the balance between the division of labour, the extent of production, and the extent of market." 17

Exponents of balanced growth contend that if a country decides to industrialize fast, the correct development strategy to adopt would be to establish a pattern of mutually supporting investments over a range of industries wide enough to overcome the frustration of isolated advance. In other words, "balanced growth is first and foremost a means of getting out

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17 See Singer, n. 10.
of the rut, a means of stepping up the rate of growth when the external forces of advance through trade expansion and foreign capital are sluggish or inoperative." Nurkse argues:

In the absence of vigorous upward shifts in world demand for exports of primary products, a low income country through a process of diversified growth can seek to bring about upward shifts in domestic demand schedules by means of increased productivity and therefore increased real purchasing power. In this way, a pattern of mutually supporting investments in different lines of production can enlarge the size of the market and help to fill the vacuum in the domestic economy of low income areas. (18)

Preobrazhensky interestingly came very close to formulating the idea of balanced growth strategy when he stated that accumulation should be sufficient to secure the development of the whole complex of the State economy, not just of certain particular parts of it, because, as he put it, chain connexion in the movement of the whole complex made isolated advance entirely impossible. Alexander Erlich rightly interpreted this as a reference to the phenomenon of complementarity between industries, a phenomenon which has since the late twenties commanded attention from prominent Western economists, such as Allyn A. Young, P.N. Rosenstein-Rodan, and Ragner Nurkse, and which has been used, in conjunction with "indivisibility" considerations, as an illustrative instance of a high volume of investment in the initial stages of the economic development of

Because of complementarities and indivisibilities no single individual investment project can be evaluated in isolation. The development of the engineering industry requires increasing quantities of steel and energy. It also calls for investment in industries which use the products of the engineering industry. Capture of the internal and external economies, therefore, requires that the entire range of investment projects should be evaluated.

Soviet planning accordingly concentrated on certain key branches or "leading links," as they were called, in each plan. During the First Five-Year Plan, the focus of attention was turned on heavy industry. During the Second and Third Five-Year Plans the focus was shifted to heavy industry, especially to metallurgy, machine-building, fuel, energy, and chemicals. Throughout, the search was for industries which were particularly capable of starting a chain reaction through the capture of economies of scale and external economies.

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20 Data prepared by Chenery and Watanabe based on an input-output analysis indicate industries with the highest linkage effect, as also industries where the economies are greater. Hollis B. Chenery and Tsunehiko Watanabe, "International Comparisons of the Structure of Production, Econometrica (Bristol), vol. 26, October 1958, p. 493. Quoted in Charles Wilber, The Soviet Model and Underdeveloped Countries (Chapel Hill, N.C., 1969), p. 89. Wilber also correctly points out that the list of industries mentioned in Chenery and Watanabe's work is similar to the "leading sectors" given priority in Soviet development.
Thus, planned co-ordinated investment in mutually supporting heavy industries was an attempt to maximize the rate of growth of the economy through capture of economies of scale and external economies.

**Appropriate Technology**

Another major aspect of the industrial development strategy pursued by the Russian/Soviet Government relates to the choice of technology. In choosing from among alternative techniques of production, the most advanced technology with a high capital-labour ratio was favoured in the basic production processes in the priority industries, while techniques with a low capital-labour ratio were preferred in the auxiliary and subsidiary processes.

The problem of appropriate technology posed itself for Russia as one of a choice between American mass-production techniques and European small-batch production methods in the nineteenth and twentieth centuries. Throughout, both in the pronouncements and in practice the preference was heavily marked in favour of highly capital-intensive technology. The choice was ultimately made in favour of American techniques. During the great industrial spurt of the 1890s, the Russian engineers

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and managers turned first towards Germany and then increasingly towards the United States. It was from the United States that a good deal of capital-intensive equipment was brought into the country. In the twenties the bias in favour of advanced technology was even more pronounced. The resolution on the economic situation adopted by the Fifteenth Party Conference in October 1926 spoke, for instance, of economic development as “reconstruction of the economy on the basis of new and more advanced technology”. In November 1928 the Party Central Committee stressed the need to “catch up and surpass the capitalist countries both technically and economically.” Khrzhizhanovsky emphasized the advantages of “equipment and productive methods which are the last word in capitalist practice.” At the Fifteenth Party Conference in October 1926 there was also general agreement as to the desirability of copying the last word in European and American technology. This preference for the latest technology soon manifested itself in practice as well. The electricity industry became an outstanding example of the use of the latest technology. The Stalingrad tractor plant was also

23 Ibid., p. 526. Emphasis added.
24 Planovee Khozvaaistvo (Moscow), no. 2, 1926, p. 15.
25 XV Konferentaiva Vsesovuznoci Kommunisticheskoi partii (Moscow, 1927), p. 194.
26 Dnieprostroi was “an example proving the possibility of American technology to our conditions.” See write-up by Aleksandrov, in Torzovo-Promvshliannaya Gazeta (Moscow), 18 November 1926.
modelled after the most advanced American plants.

Logistic Considerations

There were several reasons for this unusual stress on advanced technology. The primary motive was to augment the country's military strength through development of logistics. It is only natural that a backward country that hopes to establish military parity with the most advanced countries in the world should, in the short run at least, favour the latest technology for the basic industries; for the production of sophisticated armament capable of standing comparison with the best that is produced in the most advanced countries demands not only more steel but also better-quality steel. However, this was not the only, not even the primary, consideration that weighed with Russia/the Soviet Union in choosing highly capital-intensive techniques.

Technology to Maximize Current Output

Choice of technology is a highly complex problem that calls for the resolution of a number of important issues. Which is more important - maximization of output or of employment? Where should the accent fall - on the maximization of current output or on the creation of employment? The decision requires a balance between the two.

output or of long-term growth rates? What are the scarce factors needing economization? Then there is the question of supply-determined restrictions; demand conditions etc. These aspects of the problem are all well discussed in the literature available on choice of techniques.

Many economists agree that in an economy where the primary goal is to maximize current output, capital-intensive technology should be preferred. As Gerschenkron puts it, "borrowed technology, so much and so rightly stressed by Veblen, was one of the primary factors assuring a high speed of development in a backward country entering the stage of industrialization." Capital-intensive technology would enable the economy to secure productivity gains through realization of economies of scale. It would cut down the cost to the minimum and result in the maximization of the social surplus needed for investment.

A labour-intensive technique does not necessarily have a high output-capital ratio. On the contrary, it is quite possible for a labour-intensive technique to have a low output-capital ratio. In reality modern technology tends to be both


29 Gerschenkron, n. 21, p. 8.
labour-saving and capital-saving.

It must also be noted here that much of the literature on choice of technology implicitly assumes a two-sector model. It is often assumed that in a backward country it is only capital that is scarce. In reality, however, a backward country may, in addition to capital, suffer from many serious disabilities such as shortage of entrepreneurial talent, skilled and reliable labour force, etc. Entrepreneurs may be far too few; and such labour as is available may be uneducated and restless, so that there is absenteeism, indiscipline, and low productivity. In this condition, a backward country can assure higher productivity only by thinly spreading the scarce entrepreneurial talent and limited skilled-labour force.

30 Norton T. Dodge points out that in the Soviet tractor industry the modern plant provided very substantial savings not only in labour but also in capital per unit of output. Dodge, n. 28.


32 Gerschenkron, n. 21, p. 127.

According to Gardner Clark, in comparing German technical experience with the American, the Soviet planners noted that the German blast furnaces required highly qualified and skilled labour to operate them, whereas, in the United States, as a result of high wages, there was a tendency to "stretch out" the expensive skilled labour by the use of large-scale equipment and the substitution of semi- and unskilled labour. This was one of the factors that influenced the Soviets to adopt American technology. See Clark, n. 28.
Supply-Determined Restrictions

One cannot divorce the decision on choice of technology from the decision regarding allocation of investment. Once the allocation of investment to the various sectors and industries is decided upon, choice of techniques becomes largely a matter of the availability of supplies. The equipment that is available is far from "factor appropriate," at least with respect to the core processes. Thus the supply-determined restrictions tend particularly to be a characteristic for many of the commodities which enter demand as a result of the demonstration effect, as well as of many intermediate goods. Small-scale, labour-intensive techniques for the production of these commodities are hard to come by. Of course, in the ancillary processes and auxiliary services there may be a wider choice of techniques.

Dynamics of Competition

In addition to supply-determined limitations on choice of techniques, there are factors on the demand side which push in the direction of the use of a capital-intensive technology in a market economy. The marginal productivity approach

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33 Meir Merhav, Technological Dependence, Monopoly and Growth (Oxford, 1969), p. 52; and Wilber, n. 21, p. 92.

34 Wassily Leontier states: "The choice of alternative technologies hardly exists. The process of development consists essentially in the installation and building of an approximation of the system embodied in the advanced countries." See an article by him on the subject in Scientific American (New York), September 1963, p. 159.

35 Merhav, n. 33, p. 53.
overlooks the dynamics of competition and tends to forget the behaviour postulates in a market economy. In an institutional framework like the framework of a private enterprise economy, the pursuit of profit actuates the individual producer to look for and adopt the most productive techniques. If factor costs are equal for all firms, an individual producer can gain competitive advantage over his rivals only by introducing more and better machinery. Better machinery means more output per worker. An individual entrepreneur would choose better machinery even if output per unit of capital remains constant or, at the margin, even if it falls, so long as the total average cost is lower than it is with the older technique. Thus, in a market economy, if the entrepreneur wishes to survive in the competitive struggle, he cannot rely on the slow advances that an autonomous development of his own economy may offer; he must have recourse to advanced techniques.

In a socially managed planned economy like the Soviet economy, profit may not be the prime consideration in choosing techniques of production. Even then the planners tend to prefer techniques that assure them more output per worker. That is, the planners' preference is for advanced technology so long as the total average cost is lower than it is with the old technique. This preference, as pointed out earlier, stems from the need to maximize aggregate output and to enlarge social surplus.

This is applicable to the Russian economy.
Technological Dualism

The preference for a higher degree of capital intensity cannot properly be interpreted as applicable to all segments of the Russian/Soviet economy. Even within industry, it was applied to certain individual industries rather than to the entire complex of industry. In general, production was organized in such a way as to minimize the capital-output ratio in so far as this could be done by the substitution of labour. At the same time attempts were made to attain high-performance rates per unit of capital instead of man. In many Russian/Soviet plants it was a common sight for the most advanced capital equipment in the core processes to co-exist with the most primitive labour-intensive methods in the ancillary processes and auxiliary services. In the 1890s, for instance, in mining, the shovel-and-pickaxe method of extracting coal went hand in hand with elaborate modern techniques of utilizing coal residues, electric winding, and conveying. In the cotton mills unskilled manual labour was used for the cotton-mixing, scutching, carding, piecing, and packing processes.


38 Crisp, n. 21, pp. 40-41.
In the thirties, to cite yet another example, the Gorky Automobile plant, built on the model of the Ford-Rouge plant with the assistance of Ford engineers, was redesigned to suit Soviet conditions. Where Western equipment was used, the Soviets redesigned job descriptions so that several specialized Soviet workers performed tasks that in other countries were performed by individual skilled workers. It is very difficult to overestimate the importance of using labour-intensive methods in the auxiliary processes. A massive work force - almost half of the wage-earners in the machine-tool industry in 1948 and 58 per cent in the Ministry of Auto-Tractor and Agricultural Machine building in 1953 - was employed in these operations. Any large-scale substitution of capital for labour here would have proved a major drain on the capital resources of the country.

As stated already, attempts were made to attain high rates of performance per unit of capital rather than per man. In 1910, for instance, spindles were used more intensively than in Western Europe and Japan. In the iron and steel industry, the Soviets obtained 1.25 tons of pig-iron per cubic metre of blast furnace capacity per day in 1958, compared with about 0.92 tons per cubic metre in the United States. Without this


41 Crisp, n. 21, p. 41.
utilization differential the Soviets would have needed another 39 blast furnaces to produce the same output. This same approach was used in the transportation industry.

Economizing on Capital through Multi-Shift Operations

Yet another way of economizing on capital was through multi-shift operations of plants. Both before and after the Revolution of 1917 many industrial plants operated in two shifts. Producers of textiles made their mills work in order to raise their annual output. Till the 1890s the average working-day per spindle was 17.3 hours. This gave about 5,000 spindle hours a year. Even as late as 1910 the use of spindles continued to be intensive, the average being nearly 4,200 hours a year— as against 3,000 on an average in other countries. Multi-shift operations reached a peak in the Soviet Union in 1932, when the shift co-efficient reached 1.73. It declined slightly in the mid-thirties. In 1959 the shift co-efficient for industry as a


44 Crisp, n. 2d, p. 41.

45 In the early thirties the practice of working in three shifts was introduced. Soon, however, it was discarded except where the technology demanded it (i.e. except where it was considered necessary for the purpose of carrying out repairs, clean-up, etc.).
whole was 1.55. The co-efficient figures for industry as a whole in the United States, the United Kingdom, and other leading industrial countries of Europe were much lower. Multi-shift operations enabled the Russian/Soviet industry to adopt advanced technology with a higher capital-labour ratio. The strategy of dual technology and intensive utilization of capital tended to lower the capital-output ratio.

Of course, the Russians/Soviets not only initiated and adopted advanced technology from the West but also attempted, particularly during the Soviet period, to design and produce capital equipment. They often combined American and European designs in producing the needed machinery; sometimes they fabricated equipment that was entirely new. A familiar example of this is the Magnitogorsk Steel Works. Overriding the advice of their American consultants, the Soviets designed blast furnaces larger than the largest that the American consultants thought prudent. Khachaturov points out that the Soviet railroad practice corresponds neither to the American nor to the general European pattern; it is rather a combination of the two.

Gigantomania

Another important aspect of the strategy of industrial development of the Tsarist/Soviet Government relates to the problem of bigness. As in many other backward countries, industrialization in Russia/the Soviet Union was also characterized

47 Clark, n. 27, pp. 65-66 and 84.
by bigness of both individual plant and individual enterprise. In its anxiety to promote industrial growth the State showed little interest in small plants and enterprises. On the contrary, it evinced a very strong preference for large, integrated plants with high fixed-to-variable cost ratios, and specialized with respect to products.

Commenting in 1898 on the enormous size of Russian firms in the textile industry, a German textile specialist observed that in place of each such firm there would have been at least eight separate ones in the United Kingdom.

The emphasis on large-scale rather than on small-scale production became more regular and more pronounced throughout the planning era. Industrial concentration reached higher levels in the Soviet Union than anywhere else. Indeed, at some stage in the early thirties, it became so disadvantageous as to force the Soviet leadership roundly to condemn "gigantomania."

**Table 2**

<table>
<thead>
<tr>
<th>(TABLE 2)</th>
<th>DISTRIBUTION BY SIZE OF SOVIET INDUSTRIAL ENTERPRISES IN THE EARLY SIXTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of enterprises</td>
<td>Gainfully employed</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

48 In some cases the Soviets did build flexibility into plants. For instance, in the tractor industry the possibility of conversion of tractors into military tanks was provided for. This was for military rather than for economic reasons.

49 Crisp, n. 21, p. 41.
<table>
<thead>
<tr>
<th>Plant Size</th>
<th>Gainfully Employed</th>
<th>Total Number in 1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 100</td>
<td>29.8</td>
<td>41.2</td>
</tr>
<tr>
<td>From 100 to 500</td>
<td>45.8</td>
<td>23,302</td>
</tr>
<tr>
<td>From 501 to 1,000</td>
<td>12.7</td>
<td></td>
</tr>
<tr>
<td>Over 1,000</td>
<td>11.7</td>
<td></td>
</tr>
</tbody>
</table>


Plant Size and Productivity

There were several reasons why the Russians/Soviets preferred to go in for big plants and enterprises. For one thing, the technology chosen typically favoured large plants. More importantly, big plants and enterprises helped realize the advantages of economies of scale. In exercising their choice in favour of big plants and enterprises, the Russians/Soviets expressed their preference for productivity gains of an indivisible plant with a few large units, rather than for the flexibility advantage of a divisible plant with many small units. In other words they chose lower optimal-output costs that could be attained with higher fixed-to-variable cost ratios.

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50 This kind of relationship between plant size and productivity is well brought out in a number of interesting studies on the subject. See, for example, Balassa, n. 2, ch. 6.

51 Berliner, n. 37, p. 175. Also see Clark, n. 27, pp. 65-69.

According to a Soviet textbook, expansion, integration, and combination among firms are determined (footnote contd.)
TABLE 3

DISTRIBUTION OF SIZE OF RUSSIAN INDUSTRIAL ENTERPRISES, 1901-1914

<table>
<thead>
<tr>
<th>Size of plant</th>
<th>Enterprises</th>
<th>Percentage</th>
<th>Workers</th>
<th>Percentage</th>
<th>Enterprises</th>
<th>Percentage</th>
<th>Workers</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 100 workers</td>
<td>15,168</td>
<td>83.9</td>
<td>414,785</td>
<td>24</td>
<td>11,117</td>
<td>78.4</td>
<td>348,876</td>
<td>17.8</td>
</tr>
<tr>
<td>Between 101 and 500 workers</td>
<td>2,288</td>
<td>12.6</td>
<td>492,095</td>
<td>28.9</td>
<td>2,253</td>
<td>16.1</td>
<td>504,440</td>
<td>25.7</td>
</tr>
<tr>
<td>Between 501 and 1,000 workers</td>
<td>403</td>
<td>2.2</td>
<td>288,133</td>
<td>15.8</td>
<td>432</td>
<td>3.1</td>
<td>296,347</td>
<td>15.1</td>
</tr>
<tr>
<td>Over 1,000 workers</td>
<td>243</td>
<td>1.3</td>
<td>525,637</td>
<td>30.9</td>
<td>344</td>
<td>2.4</td>
<td>811,197</td>
<td>41.4</td>
</tr>
</tbody>
</table>

18,102     100     1,701,650 100     14,146     100     1,960,860 100

George Stigler makes a distinction between the adaptability and the flexibility of a fixed plant. A given stock of capital is adaptable if it can be combined with varying amounts of the variable factors. He notes two principal techniques for building flexibility into plants, viz (1) divisibility and (2) low fixed-to-variable cost ratios. Flexibility is built into plants to offset the effects of imperfect adaptability; for, with imperfect adaptability, any output rather than the optimum would either involve prohibitively high marginal costs or prove highly unprofitable.

An enterprise in a market economy builds flexibility into plants because of the uncertainty about future demand and level and composition of output. If a plant is so designed that the lowest average costs are attained only at the optimum output, it would expose that plant to this uncertainty in the event of any change in economic conditions. However, where industrial development is strongly supported by the Government through a policy of expanding demand for industrial products, there is no need for deep concern for unanticipated and uncontrolled variations in demand or output. Further, in a planned economy of the Soviet type, there is far less uncertainty than there is principally by the need to economize on social labour and by cost (including transportation) requirements. See Nicolas Spulber, The Soviet Economy: Structure, Principles, and Problems (New York, 1969), p. 58. See also Crisp, n. 21, pp. 40-42.

elsewhere. Hence the choice of a plant size that would give rock-bottom average costs becomes rational.

Standardization and specialization were other major features of the Soviet choice of techniques. For instance, during the thirties only three basic tractor models used to be produced in the tractor industry. The motive behind this policy was, of course, to secure economies of scale.

RESULTS OF GOVERNMENT STRATEGIES

The various strategies of market expansion employed by the Government in Russia/the Soviet Union resulted in remarkable rates of growth of industrial production. These rates of growth were much higher compared with industrial growth rates in other countries. However, as we have already seen, this did not help Tsarist Russia to catch up with the industrially advanced countries of the world.

TABLE 4

GROWTH OF INDUSTRIAL PRODUCTION IN TSARIST RUSSIA - AVERAGE ANNUAL RATES OF GROWTH

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1862-82</td>
<td>3.5</td>
</tr>
<tr>
<td>1885-89</td>
<td>6.10</td>
</tr>
<tr>
<td>1890-99</td>
<td>8.03</td>
</tr>
<tr>
<td>1900-6</td>
<td>1.43</td>
</tr>
<tr>
<td>1907-13</td>
<td>6.25</td>
</tr>
<tr>
<td>1885-1913</td>
<td>5.72</td>
</tr>
</tbody>
</table>

In the second half of the nineteenth century, Russia led the rest of the world in the development of transport. From 1868 to 1871 it built on an average 2,150 kilometres of railway every year. Between 1890 and 1900 the total length of railway in Russia increased by 73.3 per cent. The corresponding figures for Germany were 20 per cent; for France, 16 per cent; for the United States, 15.9 per cent; and for Great Britain, 8.9 per cent. In terms of length of railway, Russia held the fifth position in the world in 1890. It advanced to the second position by 1900.

According to some Soviet economists, during the first forty years after the Emancipation, Russia's industrial production increased almost eightfold. During the same period the increase in the industrial production of Germany was 500 per cent; that of Great Britain, 200 per cent; and that of France, 150 per cent. It is interesting to note that production in the capital-goods industry (Group A) increased more rapidly, especially in the last decade of the nineteenth century, than production in the consumer-goods industry (Group B). Between 1887 and 1897, the annual rates of growth attained in the various important branches of industry were as follows: 11.2 per cent in the mining and metallurgical industries; 10.7 per cent in the chemical industry; 9.3 per cent in the wood-working industry; 7.8 per cent in the textile industry; and 1.7 per cent

53 A. Podkolzin, A Short Economic History of the USSR (Moscow, 1968), p. 49.
54 Ibid., p. 47.
TABLE 5

AVerAGE ANNUAL GROWTH RATES OF INDUSTRIAL PRODUCTION FOR THE SOVIET UNION

<table>
<thead>
<tr>
<th></th>
<th>1928-40</th>
<th>1928-55</th>
<th>1928/40</th>
<th>1948/55a</th>
<th>1956-65</th>
</tr>
</thead>
<tbody>
<tr>
<td>(in percentages)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Official gross index</td>
<td>15.8</td>
<td>11.5</td>
<td>16.7</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Strumilin value added index</td>
<td>17.4</td>
<td>10.1</td>
<td>14.7</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Western estimates of value added:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seton index</td>
<td>13.6</td>
<td>9.7</td>
<td>14.0</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Podgman index</td>
<td>12.9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Jasny index</td>
<td>10.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Clark index</td>
<td>10.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
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<tr>
<td>Powell index: 1928-58</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1928 price weights</td>
<td>16.1</td>
<td>10.1</td>
<td>14.0</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1937 price weights</td>
<td>9.8</td>
<td>7.4</td>
<td>10.2</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1950 price weights</td>
<td>8.4</td>
<td>6.8</td>
<td>9.7</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Moorsten-Kaplan index</td>
<td>8.4</td>
<td>6.8</td>
<td>9.7</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Mutter index</td>
<td>8.3</td>
<td>6.5</td>
<td>9.4</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Joint economic committee index</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8.3</td>
<td></td>
</tr>
</tbody>
</table>

Note: a. Excludes the war and reconstruction years of 1914-18.

### TABLE 6

**AVERAGE ANNUAL GROWTH RATES OF INDUSTRIAL PRODUCTION IN THE USSR AND SELECTED OTHER COUNTRIES**

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>USSR</td>
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<tr>
<td></td>
<td>Seton index</td>
<td>9.3</td>
<td>Nutter index</td>
<td>6.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1928-40 and 1948-65</td>
<td></td>
<td>Seton index</td>
<td>12.3</td>
<td>Nutter index</td>
<td>9.0</td>
<td></td>
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<tr>
<td>USA</td>
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<tr>
<td></td>
<td>1839-69</td>
<td>5.6</td>
<td>1869-1899</td>
<td>5.5</td>
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<tr>
<td>Great Britain</td>
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<tr>
<td></td>
<td>1760-1800</td>
<td>1.9</td>
<td>1801-1831</td>
<td>4.7</td>
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<tr>
<td>Germany</td>
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<td></td>
<td>1870-1913</td>
<td>4.4</td>
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<td>France</td>
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<td></td>
<td>1860-1900</td>
<td>2.5</td>
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<tr>
<td>Sweden</td>
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<tr>
<td></td>
<td>1870-1910</td>
<td>3.9</td>
<td>1900-1925-29</td>
<td>2.7</td>
<td></td>
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<tr>
<td>Japan</td>
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<tr>
<td></td>
<td>1905-9 - 1930-4</td>
<td>6.9</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Mexico</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>1940-60</td>
<td>6.2</td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

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**Notes:**

a. The growth rates were extended to 1965 by splicing the Joint Economic Committee index to the Seton and Nutter indices.

b. The index is for gross industrial production. A value added index would yield a lower growth rate.

in the food industry. A Soviet economic historian, I.F. Gindin, once estimated that in the last decade of the nineteenth century, output in the capital-goods industry increased by 140 per cent and that the output in the consumer-goods industry rose only by 74 per cent. Thus industrial development in Tsarist Russia was much faster than in many other countries.

The rate of industrial development during the Soviet period is generally regarded as especially striking. It is quite high even according to the conservative estimates of Western scholars like Moorsteen and Kaplan and Nutter. According to Gerschenkron's estimates, industrial output grew at the average annual rate of 18.41 per cent during 1928-40, 22.61 per cent during 1946-55, 13.06 per cent during 1950-55, and 10.52 per cent during 1955-60. Within this overall growth the output of the capital-goods industry increased at the average annual rate of 23.53 per cent between 1928 and 1940, 25.49 per cent between 1946 and 1950, 13.19 per cent between 1950 and 1955, and 11.72 per cent between 1955 and 1960. As against this, the growth rates for the consumer-goods industry were 13.76 per cent, 16.31 per cent, 11.97 per cent, and 8.22 per cent respectively for the same periods. As in Tsarist Russia, the rate of industrial growth in the Soviet period also far exceeded the

55 Ibid., p. 48.
57 Gerschenkron, n. 21, p. 255.
rates of industrial development in most of the major countries of the world.