Volume Title: Growth of Industrial Production in the Soviet Union

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Volume Publisher: Princeton University Press

Volume ISBN: 0-87014-074-4

Volume URL: http://www.nber.org/books/nutt62-1

Publication Date: 1962

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Chapter URL: http://www.nber.org/chapters/c1974

Chapter pages in book: (p. 52 - 83)

CHAPTER 3

The Product Mix: Composition, Quality, and Variety

As WE shall measure it, economic growth means expansion in the capacity to produce things, and this cannot be fully revealed in figures. If produced things did not change in nature, there would be only the technical problem of measuring quantities; but growth and change go hand in hand, and the gray area of "qualitative change" cannot be captured in quantitative form.

We are interested in the qualitative changes resulting from greater or lesser productive activity with a given technology. For our purposes, the quality of an item may be taken as improved when more resources are used to produce it, and worsened when fewer are used.[1] The term is, therefore, being used in a very restricted sense, since in ordinary usage it also refers to such things as change in the efficiency with which something is produced, or in its value in use.

Soviet attitudes on production differ from those in the West, and for this reason the pattern of qualitative change has been different. In the background lie two basic factors. First, Soviet industry has been split in two, one sector—heavy and military industry—being systematically favored over the rest. Second, the economic system has an inherent quantitative bias, traceable in part to the working of the system itself and in part to the crusading nature of communism.

These forces work both for and against each other, and the result is mixed as far as the qualitative aspects of growth are concerned. Alec Nove is justified in warning us against sweeping conclusions based on the volume and sharpness of internal complaints about the quality of goods:[2]

> It is generally assumed that poor quality is a characteristic of Soviet production. This assertion has some truth in it, but needs to be carefully qualified. There is evidence that Soviet industry is capable of first-class precision workmanship, and also plenty of evidence to the contrary: of bathroom taps which do not run and textile dyes that do.

[1] Improved quality does not, of course, always result from additional expenditure of resources. With inefficiency not difficult to imagine, a leaky fountain pen could be more costly than a leakproof one. We must suppose that the optimum available technology is, or would be, used in every case being compared.

[2] A. Nove, "The Pace of Soviet Economic Development," *Lloyds Bank Review*, April 1956, pp. 11 ff.

One should beware of concluding that poor quality is an inherently "Soviet" characteristic. It would be wiser to bear in mind that these things are, at least in part, consequences of the sheer pace of Russia's industrial revolution. An industry staffed by half-trained ex-peasants is apt to produce a high proportion of spoiled work, under communism, fascism, feudalism or any other system known to man. With the passage of time, Russia has acquired a fairly large skilled-labour force, but there has not been enough of it to go around, and priority has been given to heavy industry. This, and the inevitable effect of a constant seller's market, has certainly tended to depress the quality of consumers' goods and the standard (as well as the rate) of house building. Even so, this state of affairs cannot be assumed to last indefinitely, and the visitor who finds (as the author of these lines did) that door handles come off in hotels should not conclude that Soviet industry produces defective railway locomotives or machine tools. Door handles have no priority.

It is important not to be misled by the large number of criticisms of defects which appear often enough in the Soviet press. It is easy to catalogue these criticisms and derive from them a picture comforting for the complacent but fundamentally inaccurate. The system as a whole is not chaotic, even though examples of chaos can be properly cited; it does work. The essential fact is that the U.S.S.R. is a vast country of contrasts, which has developed very unevenly, with the good and the bad existing still side by side. One should also remember that inefficiencies in Western countries would be better known if the private affairs of firms were liable to be released to the press. In the U.S.S.R., the authorities use publicity in a carefully selective way. Hence an outburst of criticism directed at some sector is not necessarily proof that it is peculiarly defective, or that its efficiency has declined; the reason may be a decision to launch a campaign to improve it, or possibly even a desire to discredit the minister in charge.

Most of what Nove says should be heeded, but his warning is in a sense too strong. Whatever might be true for the future, Soviet industry in the past has been the model of austerity, and this is relevant in studying its growth. In the emphasis on quantitative growth, the simple has been generally favored over the complex and amount over quality. The result has been an economy with products less varied than in the West, with a product mix more heavily weighted in favor of producer and military goods, and with a quality of goods generally lower.

Many Soviet products in areas like heavy industry and the military sector now equal or excel Western products, demonstrating rapid progress in these fields. But there has not been the across-the-board improvement that has characterized Western industrial growth. The most marked improvements have been in metallurgy, machinery, and munitions; otherwise, growth has been primarily quantitative, consisting in expanded output of standardized commodities.

An anecdote of the second world war[3] portrays this contrast. During an air raid a Western ambassador and his military attaché watched a Soviet anti-aircraft battery manned by young women who maintained a rapid rate of fire on attacking aircraft. The attaché, an artillery officer, was fascinated by the Soviet guns and the efficient way they were being handled. After the raid was over, he took out his pipe for a smoke and broke a dozen matches before getting one to light. Pointing to the matches and the guns, he burst out: "How can people who make and work guns like that make matches like this?"

This contrast needs to be understood, especially in relation to other Soviet developments. We shall see how it conditions responses to stresses in the economic system bringing about unevenly distributed swings in the quality of production. We shall then turn to qualitative trends over the long run, and conclude with a discussion of the product mix in different segments of industry.

Qualitative Changes in the Short Run

The first period of stress faced by the Soviet economy came in the decade following the revolution. Civil war and internal disorder had caused industrial production to fall to around a fifth of its prerevolutionary level by 1920. Although a large segment of industry had already passed over to state ownership, the shaping of a new economic order was to take place while industry was recovering in the period of the New Economic Policy (1921–1928). One characteristic of this formative period was a deterioration in the quality of industrial goods.

This problem was evident at the launching of the five year plans, being widely commented upon by Soviet officials as well as foreign observers. We find William Henry Chamberlin writing as follows in 1929:[4]

> There is probably no method of measuring quality as precisely and definitely as one may ascertain quantity in industrial production. But

[3] Related to me by Professor John H. Young.
[4] W. H. Chamberlin, *Soviet Russia*, Boston, 1930, pp. 155 ff.

it is the unanimous testimony of Russian consumers, a testimony which is not contradicted, even by Soviet economic officials and experts with whom I have talked, that the quality of Russian products, especially of wearing apparel and many other articles of immediate consumption, has not reached the pre-war level. Several years ago Leon Trotzky initiated the idea of a commission which should hear complaints regarding the quality of industrial production; its offices were soon flooded with boots that leaked after the first trial, knives that failed to cut, textiles that tore after a short period of wear, etc. Krzhizhanovsky, President of the State Planning Commission, admits that "the quantitative needs of production often compel us to ignore quality." (*Basic Problems of the Control Figures for 1928–1929*, p. 9.) And here is an excerpt from *The Conjuncture of Industry for 1927–1928* (p. 38), a book published under the auspices of the Supreme Economic Council, regarding the quality of production during this period:—

"During the year there were complaints regarding deterioration of quality from the metallurgical industry, because of the increased number of cinders from the coal, and from the railroads, because of the increased quantity of damaged goods in some products of the metallurgical industry. There were also complaints regarding the deterioration of the quality of overshoes, shoes, building material, aniline dyes, some forms of agricultural machinery, etc."

In a report of its findings on consumer goods, the commission referred to by Chamberlin stated, among other things, that galoshes wore only half as long as in 1913, that textiles had similarly depreciated, and that shoes had gotten even worse. In four factories producing cotton textiles, 45 to 63 per cent of gray goods and 24 to 50 per cent of finished goods classified as "standard quality" were found to be defective, or *brak* in the Soviet terminology. The shoes produced in five factories were all characterized by the commission as *brak*. Boxes of matches were found to be 15 per cent short in count, and packages of cigarettes and cheap tobacco (*makhorka*) 20 per cent short in weight.[5]

Conditions in this period are tersely summarized by Professor Calvin Hoover, who wrote in 1931 that "there can be no argument about the miserably poor quality of product of Soviet industry up to the present time. This poor quality is constantly criticized by the Soviet press, and there is an earnest desire to improve it. But partly on account of the

[5] I. Z. Kachanov, "O kachestve potrebitel'skikh tovarov" [The Quality of Consumer Goods], *Ekonomicheskoe obozrenie* [Economic Survey], 1929, No. 10, pp. 23, 31, 33, and 39.

necessity for increasing the quantity of production, and partly on account of the shortage of raw material, execrable quality continues to characterize Soviet manufactures."[6]

These conditions persisted and perhaps worsened through the First Five Year Plan, when pressure mounted for accelerated growth. According to Elisha Friedman, "not only was the Plan unrealized with respect to quantity, but far more so with respect to quality of workmanship. This was true not only of finished goods but even of some semi-finished products and raw materials such as coal, coke, ores, and metals."[7] He cites the following examples of poor quality criticized in the Soviet press: raw steel, strip copper, tungsten acid, molybdate of ammonium, calcium carbide, cast-iron taps, insulated electrical wiring, steel castings, copper and bronze fittings, tractors and their component parts, electric light bulbs, footwear, textiles, clothing, glassware, and calculating machines.[8] He says of the tractors:[9]

> Because the raw material was poor the finished tractors could not stand up under use. A machine tractor station in Azerbaidzhan received thirty-two tractors from the Stalingrad plant. When they were assembled many defects were revealed. Their rims did not fit; the radiator pipes of thirty tractors leaked at two to seven places. Other difficulties too numerous to mention were found. After running in neutral for a short time the tractors began to backfire because the porcelain of the sparkplugs burst. Similarly the tractors of the Red Putilovetz plant proved inferior in quality. Of a shipment of thirty sent to the Volokolam tractor station one was sent back within four days for an overhauling, and eleven others which could not even start to work were left out in the fields. But the loss from tractors which failed completely was less than from the others which must be stopped every two or three hours for repairs. These criticisms were not confined to the tractor stations. From all over the Soviet Union came sworn complaints of difficulties, such as leaking radiators, poorly cast cylinder heads, loose bearings, broken valve springs, unsatisfactory threading on sparkplugs, etc.

As planning became more realistic and the industrial base expanded, the pressures undermining quality also lessened. There seems to have been

[6] C. B. Hoover, *The Economic Life of Soviet Russia*, New York, 1931, p. 46.
[7] E. M. Friedman, *Russia in Transition*, London, 1933, p. 120.
[8] *Ibid.*, pp. 120 and 282 ff.
[9] *Ibid.*, pp. 283 ff.

a general improvement in quality of goods during the Second Five Year Plan, except in certain areas of consumer goods. An article on textiles appearing in a Soviet trade journal in 1936 states that "only a complete lack of attention to technological processes, a race for quantity, a lack of proper interest in the quality of production, and the existence of regulations that cover up the production of substandard goods have created this vicious circle that has led to a deterioration in the quality of the textiles on the market."[10]

Developments from 1937 to recent years are shrouded in secrecy. The political purges, the mounting military preparedness program, and the retarding industrial growth probably led to a general worsening in quality of production during the short-lived Third Five Year Plan, but the details cannot be known. The growing problem of quality control would seem to be reflected in the issuance by the Presidium of the Supreme Soviet of the ukase of July 10, 1940, stating that "the output of defective or incomplete products that do not meet compulsory standards is a crime against the state equivalent to wrecking," and setting punishments for this crime at five to eight years imprisonment.[11]

Like most economic details, the problem of quality was not commented on widely in the Soviet press during the decade following World War II, but it received increasing attention toward the end of the Fifth Five Year Plan, particularly after Premier Bulganin's report of July 1955 on problems of industrial development.[12] In setting the tone for succeeding discussion, he stated: "It is necessary that those who neglect the quality of production, and thus crudely trample underfoot the interests of the state and the population, be severely punished. Party organizations are called upon to play a great role in the struggle for the quality of production." His references to poor quality included consumer goods, fuels, metallurgy, and machine building.[13]

Bulganin singled out the difficulties in meeting "assortment plans":[14]

[10] P. Fadeev and D. Zamkovskii, "O kachestve standartov tekstil'nykh tovarov" [On the Worth of the Standards for Textiles], *Voprosy sovetskoi torgovli* [Problems of Soviet Trade], 1936, No. 10, p. 40. To qualify as *brak*, a cotton fabric had to have more than eight holes and seventeen spots or stains in a bolt of thirty-five to forty meters; a woolen fabric, more than 120 holes and 240 spots or stains (see *ibid.*, p. 37).

[11] *Voprosy sovetskoi torgovli*, 1940, No. 8, p. 3.

[12] N. A. Bulganin, "Concerning Tasks in the Further Advance of Industry, Technical Progress and Improvement of Production Organization" (a speech at the Plenary Session of Communist Party Central Committee, July 4, 1955), *Current Digest of the Soviet Press*, VII, 28, pp. 3–20 and 24 (original text in *Pravda* and *Izvestia*, July 17, 1955). Henceforward this will be cited as: Bulganin, "Tasks."

[13] Bulganin, "Tasks," p. 16.

[14] *Ibid.*

A serious defect in the work of industry is the mistaken practice, which is most harmful to the national economy and which we have not outlived, of the nonfulfillment of the production plan in terms of category quotas.

. . . For example, although the Ministry of Ferrous Metallurgy overfulfilled the 1954 plan for rolled metal production as a whole by 173,000 tons, it failed to produce 155,000 tons of special large and small rolled steel sections, which are in short supply, 85,000 tons of rolled wire and 25,000 tons of rolled wheels.

Several branches of machine building also do not fulfill the plan for the established categories of goods.

The Ministry of Heavy Machine Building, which overfulfilled the over-all production plan for 1954, failed to fulfill the plan for the production of metallurgical equipment, forging and pressing machines, various types of lifting and transport equipment, diesel engines, and gas generator motors. The Ministry of Machine Tools overfulfilled the plan for 1954 for the total quantity of metal-cutting lathes and forging and pressing machines. However, it has not fulfilled the plan for production of the more important types of heavy machine tools and forging and pressing equipment.

The Ministry of Electrical Equipment overfulfilled last year's over-all production plan. However, the tasks of production of such important types of goods, essential for the national economy, as electric motors exceeding 100 kilowatts, power transformers and generators for steam and hydraulic turbines have been considerably underfulfilled by the ministry.

One can find many similar examples in other fields of industry.

The volume of criticism grew around the end of 1956 and early in 1957, following a year in which difficulties had been encountered in meeting the goals of the new Sixth Five Year Plan, leading finally to abandonment of the plan in the fall of 1957. It may be useful to quote from articles appearing at that time to illustrate that the tendency for quality to deteriorate in times of stress has carried over to recent years.

An editorial, "Constant Attention to Quality of Output," appearing in *Pravda* on December 7, 1956, focused attention on deteriorating quality. It says in part:[15]

. . . Losses from unacceptable production have risen rather than fallen,

[15] *Current Digest*, VIII, 49, p. 24. For more complaints about agricultural equipment, see *ibid.*, p. 26; *ibid.*, IX, 5, p. 27; and *ibid.*, X, 3, pp. 26 f.

and the output of goods of poor quality continues. The quality of the output of a number of tractor and farm machine plants is not good. In the first nine months of 1956 the Ministry of Agriculture's receiving agents were compelled to reject and return to factory assembly shops more than 15 per cent of the machinery intended for shipment to Machine and Tractor Stations and collective farms. The number of defective tractors coming off the lines of the Kharkov and Vladimir Plants has been greater than in 1955. The Stalingrad Tractor Plant has been guilty of especially grave violations of the technical conditions for manufacturing and assembling machines. This enterprise's officials have not organized a struggle against defective output in the machine shops, and as a result many defective parts reach the assembly shops. This has resulted in the rejection as defective of 28 per cent of the DT-54 tractors turned out in the first nine months of 1956. Many machines are being rejected as defective at other plants of the Ministry of Tractor and Farm Machine Building. . . .

Losses from faulty output in Gorky's plants and factories in the first nine months of 1956 amounted to . . . twice as much as the city's enterprises saved in the same period by lowering the cost of production. . . .

. . . A group of machine builders writes *Pravda* that "after spending 1,089 hours machining one part of a surface grinder it had to be melted down again because there were blisters in the castings received from the Vulcan Plant. Many other castings received from this plant also had to be rejected as defective. The Forward Plant delivers castings of even poorer quality. Since the beginning of 1956 our plant has returned about 100 tons of castings to the suppliers as completely useless.". . .

Several weeks later deficiencies were pointed out in production and distribution of spare parts for agricultural machinery. Among other things, it was said that "machinery repairs are being seriously held up by the incomplete assortment [of spare parts]—a lack of such parts as, for instance, drive shafts, piston rings for starting motors, and some others"; that "MTS often receive unsuitable, defective spare parts, made in violation of the technical norms"; and that "parts are still supplied 'in bulk' with the result that MTS receive pistons of one size and piston sleeves of another."[16] A later letter complains about the difficulty of getting tires and tubes.[17]

[16] *Ibid.*, IX, 2, p. 30 (original text of an editorial, "Important Task of Personnel in Industry," in *Pravda*, January 11, 1957).

[17] *Current Digest*, IX, 14, p. 33 (original text of letter from two collective farm chairmen in *Pravda*, April 6, 1957).

Products of ferrous metallurgy and furniture making were also criticized. In the former case, difficulties in meeting plan goals were said to stem in part from the fact that "the steel mills are developing faster than the iron ore industry. The iron content of ore is declining constantly, even though the need for raw material is growing. Many blast furnaces continue to work with damp ore, and their productivity is therefore low."[18] In the case of furniture, the Deputy Minister of Trade is quoted as saying that the products of one factory "not only were poorly made but actually smelled of fish oil." The article says that "sometimes, because the trade personnel are not sufficiently demanding, poor furniture still manages to make its way into the stores." It is said of upholstery cloth that "the fabrics are light in weight, narrow in width and impractical, and their colors are poor."[19]

The quality of leather footwear was appraised in a letter to *Pravda* from a local shoemaker published January 9, 1957, which reads in part as follows:[20]

> Every year our industry turns out more footwear. It fulfills the plan as far as quantity goes; however, the quality of the footwear remains low. Every day my work as a shoemaker convinces me of this.
>
> The following factories turn out poor quality footwear: the Kaganovich Plant in Minsk, the Severokhod Plant in Yaroslavl, the Paris Commune Plant in Moscow, and plants in Orel, Shakhty, Yerevan, Tbilisi and many other cities. Very often the products of these plants have to be repaired two or three weeks after they are bought.
>
> Why do shoes wear out so fast? The trouble is that the glue and waxed thread do not hold the soles. The composition inner sole comes off and sticks to the socks, and after a month and a half the leather sole comes off, along with the welt; the nails and the iron and copper screws turn inward and prick the feet; the poor-quality counter lining soon tears and the counter chafes the feet. The tops of the shoes produced at the Shakhty and Tbilisi Plants are especially bad. . . .

Against this volume of complaints about quality in very recent years, we

[18] *Current Digest*, VIII, 50, p. 30 (original text of an article, "Overcome Lag of Ferrous Metallurgy in Dnieper Area," in *Pravda*, December 10, 1956).

[19] *Current Digest*, VIII, 50, p. 33 (original text of an article, "About Comfortable and Beautiful Furniture," in *Izvestia*, December 15, 1956). See also *Current Digest*, IX, 26, p. 16; *ibid.*, IX, 38, p. 24; and *ibid.*, IX, 40, p. 24.

[20] *Ibid.*, IX, 2, p. 31. See *ibid.*, IX, 8, p. 47, for a reply from three officials of a shoe factory published in *Pravda*, February 26, 1957. While admitting the poor quality of footwear; these officials place the blame on inadequate raw materials. See also a letter on children's shoes in *Current Digest*, IX, 26, p. 32 (original text in *Izvestia*, June 29, 1957). On other items of clothing, see *Current Digest*, IX, 35, p. 25, and *ibid.*, IX, 45, p. 29.

must place the accumulating evidence of a trend toward improvement in the quality of consumer goods since the death of Stalin. We see this reflected in eyewitness accounts of qualified observers who have visited the Soviet Union at different times separated by passage of years, in the postwar as well as the interwar period.[21] We may infer the same thing from the increasing diversion of resources to consumer goods: from 1950 through 1955, output of consumer goods apparently grew more rapidly than total industrial output (see Table 59).

In drawing a moral from the instances of quality deterioration described in the Soviet press, we must therefore bear in mind the warnings of Nove and not conclude too much. The focusing of criticism on particular industries—as agricultural machinery, textiles, footwear, furniture—may represent special campaigns to bring about improvements. At the same time this does not explain the bunching of complaints, spread over a wide area of products, that seems to occur when industry is having difficulty fulfilling the quantitative tasks set for it. In times of stress, quality tends, in response to the pressures described in the preceding chapter, to depreciate as the growth rate slows down, making the quantitative record look better than it is. These temporary deteriorations in quality get concentrated in areas of lower priority—particularly consumer goods—but they may spill over into more favored areas if the stress is great enough, as it apparently was in the early Soviet period and during the short-lived Sixth Five Year Plan. Whether such "cyclical" worsening of quality persists over the long run is another story, to which we now turn.

Qualitative Changes in the Long Run[22]

Trends in quality also reflect the basic contrast in priorities. In the favored sectors of industry—primarily within the three "M's": metallurgy,

[21] See, e.g., the articles by Elizabeth Swayne in *Printer's Ink*, August 14 and 21, 1959 and *Profit Parade*, July and August, 1959.

[22] The discussion in this section and the following one is based largely on data in the tables and notes of *Statistical Abstract of Industrial Output in the Soviet Union, 1913–1955*, New York, NBER, 1956. Citations will be made only when other sources are used.

Our knowledge of technical conditions has been greatly improved as a result of recent visits to the Soviet Union by U.S. industrial delegations under the cultural exchange programs. Some of the reports that have been issued are: "Russian Metallurgy," *Journal of Metals*, March 1958; *Report on Visit of U.S.A. Plastics Industry Exchange Delegation to USSR, June 2 to June 28, 1958* (Society of the Plastics Industry), New York, n.d.; William E. Vannah, "A Team Reports on Control Inside Russia," *Control Engineering*, November 1958; *Steel in the Soviet Union* (American Iron and Steel Institute), New York, 1959; *A Report on the Visit of an American Delegation to Observe Concrete and Prestressed Concrete Engineering in the USSR* (Portland Cement Association), Chicago, 1959; *A Report on USSR Electric Power Developments, 1958/59* (Edison Electric Institute), New York, 1960; and "Soviet Computing Technology—1959," *Transactions* (Institute of Radio Engineers), March 1960, and *Communications* (Association for Computing Machinery), March 1960.

machinery, and munitions—rapid growth in output has been accompanied by substantial improvement in quality; in the neglected sectors—primarily within the three "C's": consumer goods, construction materials, and chemicals—quality has improved slowly and, in some cases, even depreciated.

Let us recall that, for our purposes, quality is being measured by costliness under the ruling technology and not by usefulness in some other sense. Similarly, we are not concerned at this point with the elements of economic growth that fall customarily under the heading of technological improvements. We are simply trying to isolate those "physical" dimensions of growth in a product that are not captured in the available measures of physical output. Since the item given in statistics as a "product" is usually a mixture of products narrowly defined, qualitative change will involve change in the product mix as well as in the nature of individual products within the mix.

By its very nature, analysis of qualitative change must be descriptive; the results cannot be put in figures, though much of the pertinent evidence may be presented that way. In any case, most of the evidence comes from Soviet sources, and this poses certain problems. As we noted in the preceding chapter, performance in some sectors of industry is shielded from view, and this applies to changes in quality as well as in output. On the one hand, these sectors include declining or very slow-growing industries, where quality is also probably improving very slowly or not at all—possibly even worsening. On the other hand, they also include industries closely related to military production, where, by all visible signs, quality has improved in pace with output.

Again as we have already noted, criticisms of specific industries appearing in the Soviet press may at times be more directly related to campaigns for reform than to worsening conditions. One must be careful to go beyond these sporadic outbursts before drawing conclusions about long-run developments. But this is made difficult by the fact that the qualitative aspects of growth have not been systematically discussed in the Soviet technical literature. The picture of historical changes in quality within a particular industry must be pieced together from widely scattered fragments of information.

Any discussion of qualitative changes, no matter how extensive it may appear to be, is bound to be annoyingly incomplete. Moreover, too much remains unseen to know how representative the fragmentary description actually is. With this repeated warning, we proceed to say what can be said.

EXAMPLES OF IMPROVING QUALITY

The world has witnessed the rapid Soviet progress in the three "M's" and little more need or can be said here. Metals such as steel, aluminum, and tin have been entering increasingly into world trade and have competed successfully with the products of other countries. According to first-hand reports of qualified Western observers, the postwar Soviet iron and steel industry—except possibly for rolling mills—is technically on a comparable footing with the British and American industries,[23] though the products are of somewhat lower quality.[24]

Soviet machinery and equipment, though often copied from Western prototypes and produced on a more standardized basis, have apparently kept pace with technological developments in special areas. This is certainly true of military weapons and equipment, in novel as well as conventional lines, as we know from the fact that fission and fusion bombs have been exploded, powerful rockets launched, satellites orbited, and so on. In warfare itself, the world has observed the high quality of tanks, aircraft, artillery pieces, and rockets. Unfortunately, these "eyewitness" observations cannot be fortified by systematic evidence from open source materials, but there would seem to be no reason to question the Soviet advances in these fields, as far as quality of production is concerned.

Industrial products connected with other favored activities, like education and science, have also probably shown marked improvement over the Soviet period, though extensive documentation is again lacking. Even within the more neglected sector of consumer goods, there has been improvement in durable goods, at least in the sense that new products have been introduced: television, long-playing records, aluminum pots and pans, cameras, watches, and so on. As an example regarding consumer perishables, higher-grade tobaccos have displaced the traditional low-grade *makhorka* absolutely as well as relatively.

In another relatively neglected area, construction materials, there has been a notable improvement in the quality of portland cement—though incidents such as the powdery floors at the recent U.S. exposition in Moscow suggest that there is room for further advance. Output has grown more rapidly for the better grades than for the poorer ones, so that the aggregate output weighted by 1937 Soviet prices rose by 25 per cent more over 1928–37 than aggregate output in simple tonnage. In the

[23] *Steel in the Soviet Union; Economist*, December 3, 1955, pp. 863 ff; *The Russian Iron and Steel Industry*, Special Report No. 57, London, Iron and Steel Institute, 1956; and "The Russian Steel Industry," *Steel Review*, April 1956, pp. 24–48.

[24] *Steel in the Soviet Union*, pp. 191 and 247.

case of roofing materials, asbestos shingles have been replacing roofing paper, the share of the former in output measured in square meters rising from 11 per cent in 1913 to 24 per cent in 1928 and to 32 per cent in 1955. At the same time, roofing iron has declined in importance, offsetting to some extent the shift to asbestos shingles. By 1940, the last year for which data are available, the output of roofing iron had fallen to a quarter of its level in 1913.

These random notes cover only a portion of the cases that might be cited. The imprecise and incomplete nature of the discussion illustrates the handicap an outsider labors under in trying to assess a region of activity shrouded in secrecy. This handicap is further highlighted by the importance attached to travelers' tales—Marco Polo economics—as a source of information on these qualitative matters. We do not yet know enough about the products of Soviet industry to make anything approaching a definitive appraisal of trends in quality.

EXAMPLES OF UNCHANGING OR WORSENING QUALITY

There are a number of industries in which quality of product has failed to improve or has worsened. In part, this has been the kind of development always observed in the early stages of industrialization, as machines replace handicrafts and standardized production begins to serve mass markets. The very word "brummagem," from Birmingham, has been adopted into the English language to stand for shoddy, standardized merchandise. Beyond this, it is characteristic of a centrally directed economic order for the product mix to be simplified and for variety to be de-emphasized in favor of standardized goods. Centralized planning becomes less and less efficient as the number of products multiplies. And, as products are simplified and standardized, some downgrading inevitably occurs. We may observe this in such things as the development of compulsory public education and the governmental postal monopoly in the United States.

But there is also something unique in the Soviet case, as we have emphasized several times: a stress on quantitative performance combined with the favoring of some industrial sectors over others. For industries of high priority the "quantitative bias" may be overshadowed by the obvious gains in quality, as in military weapons and machinery. As one moves down the list of priorities, qualitative improvements are likely to become increasingly secondary until the point is reached at which quality suffers absolutely in favor of quantity. The sacrifice of quality is most pronounced in sectors neglected for reasons of both internal and

external policy. These sectors are starved of the more efficient productive techniques and treated as residual claimants for resources.[25]

Coal is an example of a product with relatively high priority—at least until very recently—that has experienced a rather steady deterioration of quality. The sulfur and ash content has been rising, while the calorific content has been falling. Ash content rose gradually from 15.2 per cent in 1940 to 18.6 per cent in 1957.[26] An index of calorific content per ton of coal runs as follows:[27]

1913	100	1940	94
1928	98	1945	85
1932	97	1950	87
1937	95	1955	88

The decline is attributable in large measure to the increasing share of output accounted for by lignite, one of the cheapest forms of coal. Lignite accounted for 4 per cent of output in 1913, 9 per cent in 1928, 8 per cent in 1932, 14 per cent in 1937, and 29 per cent in 1950 and 1955.

There has also been some loss in the quality of Soviet crude petroleum as output has declined in relative importance in the Caucasian fields and risen in the Ural-Volga fields. The sulfur content (which affects actual

[25] We have a recent example of "quantitative bias" with rather far-reaching consequences in the Soviet-type industrialization of Hungary and Poland, which may have some relevance to earlier developments in the Soviet Union as well. The conditions in Hungary are documented in Bela Balassa, *The Hungarian Experience in Economic Planning*, New Haven, 1959, especially pp. 110 ff and 153 ff. In the case of Poland, we find Professor Oscar Lange, a well-known Polish economist, describing some aspects of Polish industrial development through 1956 as follows (see "For a New Economic Program," translated from the Polish in *Zycie Gospodarcze*, July 16, 1956, and reproduced for private circulation by the Center for International Studies, October 1956, pp. 2 and 5): ". . . In industry, production of substandard or unusable goods (rejects) and wastage of materials constitute a serious economic problem. At the beginning, it appeared mainly in the field of consumer goods. The diminishing quality of consumer goods became a serious phenomenon hampering the improvement of living conditions but it did not slow down the production process. At present, production of unusable goods (rejects) has extended to the mechanical industries, production of tools and transport equipment, etc. This threatens to stop the technical processes of production as well as to disrupt the production basis of the national economy. It also undermines the foundations of foreign trade.

". . . It is necessary to stop the race for purely quantitative indices which are attained thanks to low quality and high own costs. This brings about purely fictitious results, the usage of raw materials and of human labour for production of goods which do not produce the intended economic, and often even the intended technical effects (e.g., agricultural machinery improper to any use after a few weeks)."

[26] E. Sokolova, "O strukture toplivnogo balansa SSSR" [Breakdown of Fuel Produced in the USSR], *Voprosy ekonomiki* [Problems of Economics], 1958, No. 5, p. 63.

[27] This index is derived from data given on page 376. Data in *Promyshlennost' SSSR* [Industry of the USSR], Moscow, 1957, pp. 133 and 140, imply no change in calorific content between 1913 and 1955, but the implied content for 1913 is clearly too low (see page 372).

and potential octane ratings of derived fuels) ranges from 0.6 to 6.5 per cent for petroleum from the Ural-Volga fields, as contrasted with 0.01 to 0.4 per cent for petroleum from the Caucasian fields. The share of the Ural-Volga petroleum in total output rose from 6 per cent in 1940 to 29 per cent in 1950 and to 58 per cent in 1955, while the share of Caucasian petroleum fell from 87 per cent in 1940 to 57 per cent in 1950 and to 30 per cent in 1955.[28] The resulting loss in quality—it would be more expensive to produce petroleum with a lower sulfur content—may have been offset in part by an improvement in the geographical distribution of crude petroleum relative to markets for it and its products, but effects of this nature are difficult to assess.

Our remaining examples are generally in areas of lower priority. Phosphoric fertilizers provide the first case. Output is stated to be measured in terms of superphosphate of a given average content of phosphoric acid, and recent sources give a breakdown into superphosphates and ground natural phosphate. Aside from being less soluble than superphosphate, ground natural phosphate can be produced much more cheaply, since it is not processed beyond the grinding of phosphate rock. Ground natural phosphate accounted (in tonnage) for about 15 per cent of all the phosphoric fertilizers produced in 1913, for 10 per cent in 1928, for 45 per cent in 1932, for 30 per cent in 1937, for 17 per cent in 1950, and for 19 per cent in 1955. We note that the quality of phosphoric fertilizers has fluctuated sharply over various spans of years, with a trend toward worsening over the entire Soviet period.[29]

As mentioned in the preceding chapter, the term "bricks" is used in Soviet statistics to cover several things in addition to kilned clay bricks. Apparently, all types of brick-like and block-like building materials are included: bricks proper, silica bricks, sand-lime bricks, slag ("cinder") bricks and blocks, concrete blocks, and so on—possibly even building stone. Very little information is available on the composition of output over long periods, but enough is known about sand-lime and slag bricks to indicate that their share in total output has increased from 4 per cent in 1913 to 14 per cent in 1937 and to 17 per cent in 1955. Since these bricks are less costly (and generally of lower structural quality) than kilned bricks, there has probably been some worsening of the quality of "bricks" as far as this factor is concerned.

[28] M. Brenner, "Problems of Oil in Long-Range Development of USSR National Economy," *Current Digest*, X, 22, p. 5 (original text *Voprosy ekonomiki*, 1958, No. 2, pp. 16–29).

[29] Mineral fertilizers are typically transported and stored in bulk, with further losses in quantity and quality. See, e.g., *Current Digest*, X, 3, p. 29.

Glass presents an interesting example of how quality may be affected by changing the physical unit of measure. Grossman traces the history as follows:[30]

> . . . At one time a variety of units was employed, but in the early thirties tonnage became the specified physical dimension in all branches of the glass industry (window glass, bottles, flasks, tumblers). It was chosen for easier production planning (i.e. the construction of input-output ratios, capacity utilization rates, etc.) since both the raw materials for glassmaking and the semifinished product, raw glass, were measured by weight. It was, so to say, material-oriented. But this led the plants to produce the thickest and heaviest sheet glass and glassware, thus greatly contributing to the acute shortage of glass and glassware generally at the time. (The production of thick window glass was also stimulated by technical difficulties in mastering the new continuous sheet glassmaking process). Seen another way, the materials for glassmaking, especially alkali, which were also very scarce, were being used very ineffectively. The crisis finally led to a special resolution of *SNK* [Council of People's Commissars], dated April 2, 1934, which imposed utility-oriented rather than material-oriented units of measure: square meters for window glass, and number of pieces for glassware.

As a result of the second change, glass apparently got thinner and thinner. Flat glass now seems to average 2 millimeters in thickness.[31]

Paradoxically, excessive thickening and thinning of flat glass both amounted to worsening of quality from the point of view of cost, given the optimum continuous sheet process. On the other hand, the supplanting of less expensive "half-white" glass by more expensive "white" glass has improved quality. The share of white glass rose from 23 per cent in 1928 to 67 per cent in 1950.

Because of the shortage of protein in the Soviet diet, continual stress has been placed on expanding the fish catch and improving the quality of fish products. Most of the growth in fish catch has taken place in the postwar period, as a result of wartime acquisitions of rich fishing grounds

[30] Gregory Grossman, *Soviet Statistics of Physical Output of Industrial Commodities: Their Compilation and Quality*, Princeton for NBER, 1960, p. 75.

[31] See *Steklo i keramika* [Glass and Ceramics], 1955, No. 3, p. 25. The thinness of flat glass, along with careless handling, accounts for the high breakage rate: 30 to 35 per cent of the flat glass delivered to construction sites seems to be broken on arrival (see Grossman, *Soviet Statistics*, p. 124).

in the Baltic Sea and in the Pacific Ocean off Sakhalin Island. Even so, the heavy subsidies given the industry moved Premier Bulganin to remark that "every fish caught indeed becomes a 'goldfish.' "[32] Moreover, wastage and spoilage now account for around a third of the total catch, compared with about a quarter in 1936.[33]

Soviet authorities grant that progress in improving the quality of fish products leaves much to be desired. Major emphasis has been placed on diminishing the share of salted fish and increasing the shares of fresh, frozen, cured, and canned fish. As can be seen from Table 5, these

TABLE 5
COMPOSITION OF SOVIET FISH PRODUCTS, SELECTED YEARS
(per cent)

	Percentage of Total Output					
	1929	1932	1940	1950	1954	1955
Fresh and frozen fish	22	33	29	27	32	38
Salted fish	70	62	56	62	62	57
Smoked, pickled, cured, and canned fish	8	6	15	11	6	5

SOURCE: *Za sotsialisticheskoe rybnoe khoziaistvo* [For a Socialist Fishing Industry], 1931, No. 6, p. 30; *Socialist Construction in the USSR*, Moscow, 1936, p. 219; *Rybnoe khoziaistvo* [The Fishing Industry], September 1940, p. 17; and *Planovoe khoziaistvo* [Planned Economy], 1956, No. 1, pp. 84 f. Output measured in metric tons.

efforts were successful during the period from 1929 through 1940, though it is doubtful that this represents an improvement over conditions in the pre-Plan period. In any event, the product mix in 1954 and 1955 was similar to the mix in 1932. Salted fish still accounted for considerably more than half of all fish products, and cured and canned fish for less than 6 per cent. The preponderance of salted fish does not mean that Russian tastes run in that direction, as can be seen from the continual efforts to supplant salting by other preservative methods. Salting seems to persist in crude form (*grubye posol'*) because it is less expensive than canning, curing, or refrigerating.

Soap, technically defined, is a fatty acid. In the prerevolutionary period, the fatty acid content of manufactured soap ran about 85 per cent on the average, or about the same as for manufactured soap in the United States. During the First Five Year Plan, fatty acids were increasingly displaced by cheaper "fillers," and the average content dropped to

[32] Bulganin, "Tasks," p. 13.

[33] See *Sovetskaia torgovlia* [Soviet Trade], 1956, No. 7, p. 6. See also the letter to the editor in *Pravda*, February 17, 1957 (translated in *Current Digest*, IX, 7, p. 41).

a low point of about 40 per cent in 1930, rising thereafter to around 50 per cent in 1936. Changes in quality have not been reported during the postwar period, and the silence suggests that the fatty acid content has not been rising. In data on output, the loss in quality is taken into account by recording production in terms of a standard (40 per cent) fatty acid content.

Sugar in the Soviet Union is produced in two forms: as crystals and as lumps. In Soviet statistics, sugar crystals are referred to as "sand" (*pesok*) sugar, and sugar lumps as "refined" (*rafinad*) sugar. "Sand" sugar is essentially a semiprocessed crystallized sugar, whereas "refined" sugar is made by fusing "sand" sugar and cutting it into lumps. During the prerevolutionary period, more than 60 per cent of the "sand" sugar was "refined." This fraction fell to a low point of 14 per cent in 1930, rising thereafter to a peak of 43 per cent in 1937, and falling and rising once again in succeeding years to reach a level of 36 per cent in 1955. Over the entire Soviet period, the quality of sugar has therefore worsened in this respect: less than 40 per cent of the "sand" sugar is now processed into lump form, compared with more than 60 per cent before the revolution.

As we noted in the preceding chapter, in Soviet usage the meaning of "canned food" is much broader than in Tsarist and Western usage, where it is restricted to food packed in hermetically sealed containers. In Soviet statistics the term applies to many types of preserved foods, packed in bulk (e.g., pickles in the barrel) as well as in hermetically sealed containers. Data on the breakdown by hermetically sealed and bulk-packed products are meager, existing only for the Second Five Year Plan. According to figures published at that time, hermetically sealed products accounted for 37 per cent of canned food in 1933, 32 per cent in 1934, 43 per cent in 1935, and 48 per cent in 1936.[34] Since the data on total output of canned food in those years were apparently revised in 1956 to exclude some bulk products, the percentages would now be somewhat higher. In any case, canned food as given in Soviet statistics for 1913 was all hermetically sealed. Hence the product mix was downgraded between 1913 and 1934, from which low point there was a slight improvement up to 1937. To put it another way, according to Soviet data, output of preserved food multiplied about ten times between 1913 and 1937; at the same time, output of hermetically sealed products multiplied only about seven times. Changes in the product

[34] *Socialist Construction*, 1936, p. 219, and *Narodno-khoziaistvennyi plan na 1937 god* [The National Economic Plan for 1937], Moscow, 1937, p. 102.

mix since 1937 are not known well enough to be able to say what has happened to the percentage of hermetically sealed products.

The types of preserved food have changed during the Soviet period. In 1913, 80 per cent of output was accounted for by meat, meat and vegetables, and fish, the remainder being vegetables. Since 1932, 40 per cent or less has been accounted for by the former category, while the variety of other products has apparently expanded to include fruits, evaporated milk, and juices.[35] Tomatoes have typically accounted for a large share, as large or larger than all other vegetables combined.

It should, incidentally, be noted that Soviet food products are still distributed overwhelmingly in bulk, at least as far as the normal household is concerned. Very little progress has been made in packaging, a development that has added substantially to the cost of food processing in the West. The percentages of marketed output bottled or packaged for household use were as follows in 1952: butter, 2.7; vegetable oil, 2; margarine, 30; confectionery, 20; lump sugar, 8; jam, 9.4; salt, 13; beer, 27.5; and macaroni, 3.4. The percentages in 1955 were: butter, 6.4; vegetable oil, 4.5; lump sugar, 12.3; macaroni, 3.2; meat, 2.1; and milk, 9.6. In 1952, more than 80 per cent of the plum jelly was "canned" in 100-liter (26-gallon) barrels, and more than 37 per cent of the other types of jelly in barrels half as large or of equal size. Yeast was put up in packages of 100 grams (3.5 ounces) or more. Lard and other edible fats were not packaged at all, even though they had been packed in boxes and jars before the war.[36]

The leather footwear produced in prerevolutionary Russia was comparable with, and in some cases superior to, Western footwear. The low quality of present day Soviet footwear has already been described. This deterioration in quality has resulted in part from mechanization, but more importantly from troubles in the leather industry that have persisted since collectivization of agriculture in the early 1930's. The output of hard leather fell by 65 per cent between 1928 and 1935,[37] while the output of boots and shoes did not fall at all. In the same period, employment in industries producing leather substitutes multiplied about four times. The output of hard leather had not recovered to its 1928 level by as late as 1955, while the output of boots and shoes had multiplied about 2.7

[35] See *Promyshlennost'*, 1957, p. 399.

[36] F. Dubinin in *Sovetskaia torgovlia*, 1953, No. 7, p. 6; and I. K. Sivolap and A. S. Shatkan, *Pishchevaia promyshlennost' SSSR* [The USSR Food Industry], Moscow, 1957, p. 27.

[37] The quality of tanned leather also worsened in these and succeeding years (see, e.g., Grossman, *Soviet Statistics*, p. 76).

times. By 1940, about 70 per cent of the footwear produced in large-scale industry was made at least in part from leather substitutes; around 10 per cent of all footwear was made out of reclaimed materials, recovered from scraps or wornout shoes. Despite substantial downgrading of standards, between 30 and 40 per cent of the footwear produced in recent years has been substandard.

The cotton textile industry of prerevolutionary Russia was closely related to the British textile industry, because both were based on long-staple Egyptian cotton and because British firms dominated the Russian industry. Use of Egyptian cotton made possible the spinning of fine yarn: in 1913 Russian yarn had an average number of around 52, which is to say that the average length of a gram of yarn was about 52 meters.[38] By way of comparison, the average number has been as high as 51 for British yarn in recent years and around 38 for American yarn (which is spun from a shorter-staple cotton). Hence, prerevolutionary Russian yarn was about as fine on the average as British yarn of recent years, and considerably finer than American yarn.

The fine yarn was utilized to make closely woven cloth, that is, cloth with a high thread count. Thus, in 1913 the average thread count of Russian cotton cloth was apparently around 90.5 threads a square centimeter, or 230 threads a square inch. This is about the same as the thread count for British cloth, which in recent years has averaged between 200 and 250 a square inch. It is considerably higher than the recent counts for American cloth, which have averaged between 150 and 175. Manufacturing cost is higher for high-count than for low-count cloth.

During the Soviet period the quality of cloth has worsened as measured by these two characteristics: fineness of yarn and closeness of weave. No evidence is available on other important characteristics, such as tensile strength of yarn. The known deterioration in quality is shown in Table 6, which presents indexes of average yarn number and average thread count on 1913 as a base. The yarn number declined steadily—the yarn became steadily coarser—during the interwar period, dipped to a low point during World War II, and recovered to approximately the prewar level by 1955, the last year for which the number could be derived. The average yarn number in 1940 and 1955 was around 39, or about the same as for the United States in recent years. Therefore, as far as fineness of yarn is concerned, the Soviet cotton textile industry has moved away from the British standard toward the American one.

[38] The statistics used in this discussion of cotton textiles are explained in Appendix A, technical note 1.

TABLE 6
INDEXES OF SOVIET YARN NUMBER AND THREAD COUNT FOR COTTON FABRICS, SELECTED YEARS
(1913 = 100)

	Yarn Number	Thread Count
1913	100	100
1928	92	83
1930	92	77
1931	88	76
1932	81	71
1933	77	69
1934	77	73
1940	75	76
1946	63	71
1950	74	76
1951	73	75
1952	75	77
1953	75	78
1954	76	79
1955	76	80

SOURCE: Appendix A, technical note 1.

The thread count reached its low point in 1933, rose thereafter up to World War II, fell during the war, recovered the prewar level about 1950, and rose thereafter to reach a level in 1955 slightly lower than in 1928. At its low point the thread count averaged less than 160 a square inch, and in 1955 it averaged around 185. Hence in this respect, too, the Soviet cotton textile industry has left the British model and approached the American one.

It is of interest that the yarn number has declined more percentagewise than the thread count, so that the weight of a square meter of cloth has increased during the Soviet period. This is merely to say that, as far as weight is concerned, the decline in thread count has been more than offset by the increase in coarseness of yarn. Soviet writers sometimes refer to the increasing density of cloth as evidence of improved quality, whereas in fact it is the consequence of lower quality in the two dimensions usually considered relevant.

Simplification and standardization has accompanied lower quality. In the prerevolutionary period, the Russian textile industry produced

about 1,300 types (constructions) of cloth; the number was reduced to 260 in 1929/30. In recent years the number has risen to around 500, but 4 of these apparently account for 54 per cent of total output and 70 for 77 per cent.

In the prerevolutionary period, Russia was the fourth largest producer of silk and synthetic fabrics in the world. The fabrics were predominantly silk and silk mixtures; silk accounted for 93 per cent of the fibers used in weight. In succeeding years rayon became increasingly important: by 1955, rayon accounted for 90 per cent of the fibers used, while silk accounted for only 3 per cent. The remaining 7 per cent was accounted for by other synthetic fibers—mainly kapron, a fiber similar to nylon.[39] Even though Soviet statistics still refer to the industry as "silk fabrics," it now produces essentially rayon fabrics. Whether this should be called a lowering of quality is open to question. From the point of view of fabricating cost, more expensive fabrics have been relatively displaced, and in this sense there has been a loss in quality. But a similar displacement, not so pronounced, has taken place in the United States, for example. On another aspect of quality, Soviet fabrics have become highly standardized: in 1925/26, almost 500 different types of fabric were produced; by 1927/28, the last year for which data are available, the number had been reduced to less than 200.[40]

The quality of woolen and worsted fabrics has certainly deteriorated over the Soviet period, mostly during the early 1930's. This is shown first of all by changes in the product mix. For instance, the fraction of output accounted for by all-wool fabrics fell from 50 per cent in 1930 (which was already well below the average for prerevolutionary Russia) to 14 per cent in 1933. As to the wool itself, cottonized fiber and shoddy came to be increasingly important at the expense of virgin wool. From 1928 through 1931 the share of virgin wool in the weight of fine woolen fabrics fell from 43 to 20 per cent; in coarse woolen fabrics, from 67 to 48 per cent.

A different type of evidence indicates that the lower quality has persisted, though some recovery has been made from the nadir of the mid-1930's. Table 7 shows a percentage breakdown of part-wool and

[39] *Promyshlennost'*, 1957, p. 323, and *Voprosy ekonomiki*, 1956, No. 7, p. 58. There may have been a large increase in the output of silk fabrics around 1952, possibly as a result of a sudden and substantial increase in the imports of raw silk from China. This possible sharp spurt in the production of silk fabrics has proved temporary, and rayon has become once again the dominant raw material of this industry.

[40] *Izvestia tekstil'noi promyshlennosti i torgovli* [News of the Textile Industry and Trade], 1929, No. 2, p. 11.

TABLE 7
COMPOSITION OF SOVIET WOOLEN AND WORSTED FABRICS, SELECTED YEARS
(per cent)

	Percentage of Total Output		
	Worsteds	Fine Woolens	Coarse Woolens
1913[a]	54	20	26
1926[a]	54	25	21
1929[a]	41	34	25
1932	14	47	38
1937	25	37	38
1940	29	39	32
1950[b]	40	38	22
1955[b]	40	43	17

SOURCE: *Statistical Abstract of Industrial Output in the Soviet Union*, Part 4, series 1216.1; *Promyshlennost'*, 1957, p. 330. Output measured in meters.

[a] Large-scale production only.

[b] Ministerial production only. For 1940, the percentages for ministerial output were 30, 43, and 27.

all-wool fabrics into worsteds, fine woolens, and coarse woolens. The share of worsteds fell from 54 per cent in 1913 and 1926 to a low of 14 per cent in 1932, rising thereafter to 29 per cent in 1940 and to 40 per cent in 1955. At the other extreme, the share of coarse woolens rose in the interwar period, though it has fallen in the postwar period apparently below the 1913 level. The share of fine woolens has risen more than the share of coarse woolens, but there is doubt that the distinction between coarse and fine woolens has the same meaning now as in the prerevolutionary period. Almost all fabrics are mixtures of wool and cotton or wool and rayon, though it is difficult to know how important the other fibers have been in recent years. Almost all fabrics were all-wool in 1913; the fraction fell to 50 per cent in 1930, 5 per cent in 1940 and 1950, and 9 per cent in 1955.[41] The average width of fabrics also declined between 1940 and 1955.[42]

Notes on Product Mix

The purpose of this concluding section is to describe the product mix of some industrial sectors and compare it with the typical mix to be found in Western economies, especially the United States. Historical developments will not be so much at issue as the character of Soviet industry in recent years relative to conditions in other countries. Some discussion of

[41] *Za rekonstruktsiiu tekstil'noi promyshlennosti* [For the Reconstruction of the Textile Industry], 1933, No. 12, p. 4; and *Promyshlennost'*, 1957, p. 330.

[42] Grossman, *Soviet Statistics*, p. 121.

this question is needed to provide a background for estimates of comparative levels of industrial production, such as we shall make later for the Soviet Union and the United States (see Chapter 8).

In general, Soviet industrial products are more simplified and standardized than in the West, even in the more favored sectors of industry. The Soviet mix of rolled steel products is more limited in variety than the mix found in most Western countries, and the same is true for most machinery, as we shall see. In addition, the quality of a number of narrowly defined products falls short of Western standards. In some areas, such as military production, Soviet products undoubtedly match or excel their Western counterparts, but we are unable to comment further on these for lack of details. Once again we are plagued by paucity of information, and the examples we cite are simply those about which something is known.

INDUSTRIAL MATERIALS

We pointed out that lignite now accounts for around 29 per cent of Soviet coal; in the United States, it accounts for less than 1 per cent. The quality of Soviet crude petroleum, as indicated by sulfur content and similar technical standards, is on the average also lower than in the United States, the petroleum of comparable quality from the Caucasus, Sakhalin, and the Emba District being outweighed by lower-grade petroleum from the Ural-Volga region.

Raw steel seems to be up to Western standards in the alloys and specifications produced, but the range of products is much more limited. The case is similar for rolled products. From the recurring complaints about steel castings and about copper and brass products, one would assume that they are generally of lower quality than in the West. The established standards for aluminum are, on the other hand, comparable to those in the West, and there is no evidence to indicate that they are not generally observed.

We have seen that Soviet glass is very thin, averaging about 2 millimeters in thickness. Plate and other polished glass apparently accounts for less than 2 per cent of the output in square meters, in conventional units of 2-millimeter thickness.[43] By contrast, plate and other polished glass accounted in 1954 for over 60 per cent of the value and approximately 40 per cent of the square footage (unadjusted for differences in thickness) of all flat glass produced in the United States.[44] Not counting plate

[43] The planned percentage for 1956 was 1.7 (*Steklo i keramika*, 1955, No. 3, p. 25).

[44] *Census of United States Manufactures: 1954*, Washington, 1957, Vol. II, Pt. 2, pp. 32A-9 and 32A-12. Laminated glass is excluded from these calculations to avoid double

and other polished glass, the average thickness of window glass in the United States was around 2.7 millimeters in 1954.[45]

Electricity would seem to be homogeneous, but there are important differences between the Soviet and Western products. Throughout the Soviet period, generating capacity has never managed to keep up with the consumption desired at established prices; that is to say, consumption is not rationed by price. Instead, there is a system of priorities governing decisions on whose electricity is to be shut off when consumption threatens to exceed generating capacity. It is not unusual to have the supply of electricity to households and such things as street lighting, even in large cities, cut off without warning. During the middle 1930's, the same thing applied to whole sectors of industry. Another method of rationing is to reduce the current. The allowable variations in frequency and voltage of current are considerably higher on the average than in the United States, but the standards are more rigorous than in the United States in the case of defense industries, where virtually no variations in current are allowed.[46]

MACHINERY

Soviet motor vehicles are highly standardized. About a dozen models of automobiles have been produced in quantity in the Soviet Union. Half of these were introduced in the interwar period and half in the postwar period, almost all being copied from American prototypes. An American automobile company produces more basic models in a year than the Soviet Union has produced to date. Production is even more standardized in the case of trucks, where the two-and-a-half-ton model predominates.[47]

Similarly, it has been Soviet policy to keep a simple structure of basic railroad equipment. Steam locomotives have been the primary source of power, and only six types have been produced in quantity: three for

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counting. Square footage of plate glass is not given directly and has been estimated by dividing the value per unit of industrially consumed plate glass (derived from data on p. 32A-12) into total value of shipments of plate glass (given on p. 32A–9).

[45] Derived from data in *ibid.*, p. 32A-9. The thickness of different types of window glass was taken as follows: thin, 1.6 mm.; single strength, 2.31 mm.; double strength, 3.18 mm.; and heavy sheet, 4.5 mm.

[46] This paragraph is based on John Pearce Hardt, "Economics of the Soviet Electric Power Industry" (processed), Research Studies Institute, Air University, Alabama, 1955, pp. 84 ff, 314 ff, and 326 ff. It is interesting to note that the average Soviet load factor was 10 per cent lower than the U.S. factor in 1955 (derived from data in *A Report on USSR Electric Power Developments, 1958-1959*, pp. 74 and 76), indicating less effective use of capacity.

[47] This paragraph is based on *Mashinostroenie* [Machine Building], Moscow, 1947, Vol. II, pp. 264 ff; *Eksportno-importnyi slovar'* [Export-Import Dictionary], Moscow, 1952, Vol. I, pp. 70 ff; and A. A. Kurov, *Avtomobil'* [Motor Vehicles], Moscow, 1938, p. 18.

freight service and three for passenger service. There has, however, been a significant shift in production toward electric and diesel locomotives in the postwar period. Passenger cars are simple and standard.[48]

Agricultural equipment has also been highly standardized. We shall concentrate discussion here on tractors, since considerable information is available on the product mix. During the entire Soviet period, sixteen basic models of regular tractors and one type of garden tractor have been produced. This may be compared with eighteen basic models produced in the United States in 1953 by International Harvester alone. Track-laying crawlers have been favored over wheeled tractors, though both types have been produced at all times. In 1955, crawlers accounted for more than three-quarters of the drawbar capacity of all tractors in use in Soviet agriculture. During the 1920's and early 1930's, there were two basic tractor models produced; during the middle and late 1930's, there were three; and during the 1950's, there were six or seven.[49] The Soviet press has contained frequent complaints that tractors (and other agricultural equipment) are too highly standardized and, as a result, poorly adapted to many agricultural conditions.[50]

Soviet tractors are mainly copies of American models. On this score, it may be useful to quote what Professor Norton T. Dodge has to say in his comprehensive study of the Soviet tractor industry:[51]

> Despite the great improvement in the variety of types of tractors produced by the Soviet tractor industry, the models in production still lag behind American models from a technological point of view.
>
> The Soviet Union began with the production of obsolete models, and has not yet completely caught up with developments abroad. Although the Soviet Union made every effort to obtain the latest and best equipment for the factories producing tractors, the tractor models produced were chosen primarily because of their reliability, durability, and proven performance over a period of years. In view of the rough usage to which tractors were subjected under Russian conditions, such considerations were of particular importance. On the other hand, the

[48] *Current Digest*, IX, 39, pp. 24 f.

[49] These data are drawn from Norton T. Dodge, "The Tractor Industry of the USSR" (mimeographed), Washington, Council for Economic and Industry Research, 1955, pp. 23 ff; *Narodnoe khoziaistvo SSSR* [National Economy of the USSR], Moscow, 1956, p. 144; and A. M. Kiriukhin, *Traktory shestoi piatiletki* [Tractors of the Sixth Five Year Plan], Moscow, 1956, p. 36.

[50] See, e.g., the letter from four collective farm chairmen in *Pravda*, February 25, 1957 (translated in *Current Digest*, IX, 8, p. 45).

[51] Dodge, "Tractor Industry," pp. 26 ff.

reliance upon proven foreign models has led to the equipping of Russian agriculture with tractors already rendered obsolete by newer developments abroad.

For example, the Fordson was first produced in this country in 1915, and by the latter half of the 'twenties was already being superseded by newer, more versatile types. In 1928, the year the Russians began to increase Fordson capacity at the Putilov Plant severalfold, Ford shut down his Dearborn plant and ceased production of the Fordson in America.

Production of the International 15/30 began in this country in 1921, and was discontinued at the Milwaukee Plant of International Harvester in 1931, the year mass production of the Russian version of the International began. International Harvester introduced the Farmall in 1923. Ten years later, just as International Harvester was introducing an improved model, production of the Soviet version began at the Krasnyi Putilovets Plant which converted from the production of the Fordson to production of the Universal. Finally, in 1955, a modernized diesel version of the Universal is in the developmental stage. Until the present there has been no change in the basic design.

Caterpillar discontinued production of the 60 model crawler, which had been produced since 1925, in 1930. The Soviet copy was first produced in quantity in 1933, two years after the Caterpillar Diesel had come out. The Soviet version of the Diesel was in production by 1937. Two years earlier, Caterpillar began the production of an improved model, the D-7. Production of the Soviet version was delayed by the war, but in 1946 the first Stalinets-80 was produced. The ancestry of the SKHTZ-NATI and more recent postwar models is more difficult to trace, but all have borrowed heavily on foreign design and technology. The power lift, for example, came into general use in this country in the 'thirties, and the hydraulic lift was introduced in 1940. Production of the hydraulic lift in the Soviet Union did not begin until 1950. Rubber tires were introduced in this country in 1932, and became standard equipment within a few years. No Soviet tractors were equipped with rubber tires, except industrial and towing tractors, until 1950. Only one model, the Universal-4, which is used for cotton pickers, has rubber tires as standard equipment. The MTZ-1 and 2 and the KHTZ may be so equipped, but reports indicate that rubber plants are failing to meet their commitments.

Aluminum alloy sleeve bearings were introduced in this country around 1940. They are still being tested in the Soviet Union. Power

steering, oil clutches, automatic hitching, etc., are yet to be incorporated on Soviet tractors. Nevertheless, the Soviets are making rapid improvements in design, and the most archaic models and features will soon be eliminated, according to official pronouncements.

As for machinery other than transportation and agricultural equipment, quality and complexity have undoubtedly improved markedly over the Soviet period. At the same time, it is important to recognize that the general practice is to produce a limited number of standardized models. Models are changed infrequently, and machines are seldom custom-built. The user adapts to the machine, not the machine to the user. Complex machines are often constructed by combining several standardized machines. For example, a so-called "aggregate" machine tool, which is designed for automatic or semi-automatic fabrication of a particular item, is generally made out of standard lathes, milling machines, and so on, put together on a unified mount.

Since Bulganin's speech referred to above, there has been a rather steady campaign to stimulate innovation and modernization in machinery industries. For instance, in an article in *Izvestia*, December 3, 1957, a Soviet professor, A. Rybkin, states in part:[52]

> Our country has an enormous stock of metalworking machine tools; the number of machine tools in the Soviet Union surpasses the number in all European countries. However, more than 40% of our machine tools are of simple design. It is quite clear that we must alter this percentage and make more highly productive machine tools instead of simple types, and also make more up-to-date automatic and semi-automatic machine tools. . . .
>
> New bearing materials are necessary because of the great increase in the operating speeds of machinery. Incidentally, this increase has taken place not only in aviation and reaction technology but in many machines used in common industrial processes that operate under high pressure or temperature. Bearings made of the types of steel now employed no longer satisfy growing demands. Consequently it is necessary to make heat-resistant steels or alloys for roller bearings that can provide normal operating conditions for machines operating under high temperatures or pressures.

In his report on industrial organization presented to the Supreme Soviet in May 1957, Khrushchev notes that an automobile plant built in

[52] *Current Digest*, IX, 48, p. 24.

Communist China with Soviet assistance is technically superior to similar plants in the Soviet Union. He then goes on to remark:[53]

> The question arises: Could we, while supplying our Chinese friends with modern equipment, have re-equipped our own auto plants at the same time? We undoubtedly could have, but this was not done because we have the incorrect practice of planning machine-tool output without direct responsibility. As a result, plants produce large quantities of all-purpose, low-output and often obsolete equipment, which is not always needed by industry. Here are the figures. In 1956 our industry produced a total of 121,000 metal-cutting machine tools but less than 22,000 specialized and multiple-unit machine tools, or 18% of the total output. Therefore, with comprehensive planning of the production of equipment and an increase in the output of specialized machine tools, in the course of one year one could re-equip not only the Gorky and Moscow Auto Plants but some other enterprises as well, without failing to meet obligations for deliveries to foreign countries. The equipment removed from the plants as obsolete could be used for repair shops and other auxiliary services in our industry. At the moment, new machine tools are being allocated for this purpose as well as for new production.

CONSUMER GOODS

We noted above that salted fish account for around 60 per cent of Soviet fish products, fresh and frozen fish for 30 to 40 per cent, and cured and canned fish for around 5 per cent. By way of contrast, fish products in the United States (exclusive of wastage, by-products, bait, etc.) were divided as follows over the period 1950–1955: fresh and frozen fish, around 55 per cent; canned fish, around 42 per cent; and cured fish, around 3 per cent. The output of salted fish was negligible.[54]

Almost all Soviet soap is produced in bar or "hard" form. In 1937, hard soap accounted for 94 per cent of output; and in 1954, for 93 per cent. In the United States, the comparable fractions were 56 per cent in 1937 and 20 per cent in 1954.[55] The spectacular growth of detergents in the United States and other Western countries has had no counterpart in the Soviet Union.

[53] *Ibid.*, IX, 18, p. 12 (original text in *Pravda* and *Izvestia*, May 8, 1957).

[54] *Statistical Abstract of the United States, 1958*, Washington, 1958, p. 708.

[55] P. Serebrennikov, "O prekrashchenii raskhoda pishchevogo syr'ia na tekhnicheskie tseli" [On Stopping the Use of Edible Raw Materials for Technical Purposes], *Voprosy ekonomiki*, 1956, No. 10, p. 32.

Two final remarks may be made about processed foods. First, the Soviet "sand" sugar is produced in the form of crystals, not as highly processed as the granulated sugar of the West. Second, as we have noted, food processing does not generally extend to the packaging stage in the Soviet Union—not even to the bottling of milk—whereas packaged foods have become the rule in the West, particularly the United States.

In cotton textiles, Soviet fabrics are similar to American ones in average yarn number and thread count, but the variety of goods is much more limited and production is concentrated in lower-grade fabrics. About 150 yarn numbers are now produced in the United States, with 30 to 40 accounting for 95 per cent of output; only 68 yarn numbers are now produced in the Soviet Union, with 15 accounting for 95 per cent of the output. About 2,500 constructions of gray goods are produced regularly in the United States—at least 4,000 from time to time; the number in the Soviet Union is now around 500, with 4 accounting for 54 per cent of the output. Dyeing and finishing of Soviet fabrics fall far below general Western standards, since cheap sulfur dyes are used predominantly. Soviet output of cotton fabrics in linear measure covers narrow-woven as well as broad-woven goods, while American output covers broad-woven goods (those over 12 inches in width) only. The average width of broad-woven fabrics is around 69 centimeters in the Soviet Union and around 100 centimeters in the United States.[56] Both these factors must be kept in mind when comparing output in the two countries, since it is ordinarily expressed in linear, not square, measure.

In the case of silk and synthetic fabrics, rayon is now the dominant fiber in both the Soviet Union and the United States, but there is a difference in its importance in the two countries. In the United States, it accounted for 76 per cent of the combined textile mill consumption of silk, synthetic fibers (nylon, dacron, etc.), and rayon in 1955;[57] in the Soviet Union, for 90 per cent. Synthetic fibers accounted for 23 per cent in the United States, compared with 7 per cent in the Soviet Union; and silk for 1 per cent, compared with 3 per cent. American fabrics are about 20 per cent wider on the average than Soviet fabrics.[58] The variety of Soviet silk and synthetic fabrics is considerably more limited

[56] These remarks are based on data in Appendix A, technical note 1.

[57] *Statistical Abstract of the United States, 1958*, p. 800.

[58] Soviet fabrics vary from 80 to 106 centimeters in width (*Tovarovedenie promyshlennykh tovarov* [Commercial Specifications of Industrial Goods], Moscow, 1954, Vol. II, p. 124) while U.S. fabrics average about 112 centimeters according to data in the *Census of United States Manufactures: 1947*.

than in Western countries, and dyeing and finishing, as in the case of cotton fabrics, is of lower quality.

It is difficult to compare woolen fabrics for the Soviet Union and the United States because of inadequate data on relevant characteristics. American data are no longer compiled for all-wool and part-wool fabrics, but all-wool fabrics accounted for 72 per cent of output in 1929 and for at least 59 per cent in 1935.[59] In the postwar years, blends with synthetic fibers have become more popular, and the fraction has probably fallen. However, it is certainly higher than the 5 to 9 per cent recorded in recent years in the Soviet Union. Soviet blends are predominantly with cotton and rayon; in the United States, with nylon, dacron, and orlon. Up to 1951, only fabrics with 25 per cent or more wool were counted as woolen in American statistics; since 1951, only fabrics with 50 per cent or more. We do not know the comparable standards for the Soviet Union. Coarse woolens have accounted for no more than 14 per cent of output in recent years in the United States,[60] compared with 17 per cent and more in the Soviet Union. Soviet fabrics average around 128 centimeters in width,[61] while American fabrics average around 150 centimeters.

Finally, in the case of consumer durables products tend to correspond with standard, "stripped down" models of the West—they are sometimes direct copies. Mechanization has been slow in some areas. Household sewing machines, for example, are almost all foot-pedal models.

Concluding Remarks

This less than adequate look at the qualitative aspects of Soviet industrial production, hampered by the selective nature of Soviet statistics, can be summarized only in broad terms. In general, industrial products are less complex and varied in the Soviet Union than in the West, and they have improved in quality more slowly. The picture is, however, one of contrasts between the favored sector of the three "M's"—metallurgy, machinery, and munitions—and the neglected sector of the three "C's"—consumer goods, construction materials, and chemicals. In between these extremes lies a number of industries that have experienced mixed qualitative developments. Finally, Soviet industry has been subject to "cyclical swings" in the quality of production, coinciding with swings in the rate of growth of industrial output. When the growth rate slows

[59] *Statistical Abstract of the United States, 1938*, Washington, 1938, p. 784.
[60] *Statistical Abstract of the United States, 1956*, Washington, 1956, p. 816.
[61] Grossman, *Soviet Statistics*, p. 121.

down, quality begins to deteriorate; when it speeds up, quality also tends to improve. The mounting attention being paid in recent years to formerly neglected sectors suggests that this characteristic pattern of qualitative changes, both short- and long-run, may be undergoing transformation. But that is for the future to say.